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Abstract

This is the third in a series of guides to the field identification of North American marsh and water plants. Described are plants which have foliage habitually under water or floating, or which have underwater or floating forms, and which have characteristics by which they can be distinguished with the naked eye. Where genera or species cannot be distinguished with the naked eye, only group descriptions are given. The plants are divided into twelve main groups on obvious structural characteristics; once the reader has decided to which of these groups a plant belongs, he should look at the illustrations of plants in the group and read their descriptions until he has a match. Each illustration and description is headed with a common name and scientific name; in general no attempt is made to indicate the classification of the plant beyond the genus. Plants are indexed by both species name and common name. (EB)

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UNDERWATER AND FLOATING-LEAVED PLANTS OF THE UNITED STATES AND CANADA

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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March 3, 1849

North American Marsh and Water Plants

The preceding two pamphlets in this group of guides to identification of aquatic plants were published as units of a projected series on "Aquatic Plants of Eastern North America." Those two were Pondweeds and Pondweedlike Plants of Eastern North America issued in May 1964 as Fish and Wildlife Circular 187, and Bulrushes and Bulrushlike Plants of Eastern North America issued in May 1965 as FWS Circular 221.

The acceptance accorded the first two pamphlets and comments received about them demonstrate the need for extending the coverage to all of the continental United States and Canada and increasing the number of plants discussed under one cover. For these reasons plants discussed in Circular 187 are included also in this publication.

UNDERWATER AND FLOATING-LEAVED PLANTS OF THE UNITED STATES AND CANADA

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CONTENTS

Page
Introduction--How to use the guide 1-5
Plants with limp, threadlike to ribbonlike leaves coming up from the bottom or from short vertical stems; sometimes partly floating 5-13
  Burreeds 6-7
  Northern Mannagrass and Wildrice 7
  Water Bulrush 8
  Narrowleaf Waterplantain 9
  Wildcelery 10
  Flowering-rush 11
  Eelgrass 11
  Surfgrass 12
  Shoalgrass 12
  Manateegrass 13
  Turtlegrass 13
Plants with rather stiff, short leaves or nearly leafless stems in clumps or patches on the bottom; some kinds sometimes out of water 14-30
  Slender Spikerush 14-15
  Creeping Buttercup 16
  Quillworts 16-17
  Subularia 18
  Arrowheads 18-21
  Limosella 22
  Water Lobelia 22
  Dwarf Spikerush 23
  Littorella 23
  Leafless Watermilfoil 24
  Pipeworts 25
  Bog Rush 26
  Horned Bladderwort 26
  Zigzag Bladderwort 27
  Lavender Bladderwort 27
  Flowering-quillwort 28
  Pillwort 28
  Western Lilaeopsis 29
  Eastern Lilaeopsis 29
  Gulf Halophila 30
  Caribbean Halophila 30

Page

Plants with featherlike, usually limp leaves on flexible underwater stems; stem tips often sticking out of water 31-42
  Northern Watermilfoil 32
  Little Watermilfoil 33
  Whorled Watermilfoil 34
  Variable Watermilfoil 35
  Farwell Watermilfoil 36
  Marsh Mermaidweed 36
  Low Watermilfoil 37
  Eurasian Watermilfoil 38
  Parrotfeather 39
  Eastern Watermilfoil 40
  Featherfoil 41
  Andean Watermilfoil 42
  Southern Watermilfoil 42
Plants with fine-forked, limp leaves mixed with small roundish bladders on flexible underwater stems; flowers sticking out of water 43-50
  Northern Bladderwort 43
  Flatleaf Bladderwort 44
  Common Bladderwort 45
  Hidden-flower Bladderwort 46
  Purple Bladderwort 46
  Eastern Bladderwort 47
  Little Floating Bladderwort 48
  Big Floating Bladderwort 49
  Dwarf Bladderwort 50
  Giant Bladderwort 50
Plants with clustered branches or fine-forked, bladderless, usually limp leaves on flexible underwater stems; stem tips sometimes sticking out of water 51-59
  Muskgrasses, Nitellas, and Tolypellas 52
  White Water Buttercup 53
  Yellow Water Buttercup 54
  Coontail 55
  Water-marigold 56
  Lake Cress 57
  Riverweed 57
  Fanwort 58
  Alga Bulrush 59
  Limnophilas 59

Page

Plants with needlelike to oval, paired or bunched leaves on mainly flexible underwater stems; some kinds sometimes out of water 60-70
- Marestail 60
- Water-starworts 61-62
- Tillaea 62
- Horned-pondweed 63
- Waterworts 63
- Naiads (except Spiny Naiad) 64-65
- Common Elodea 66
- Goldenpert 66
- Marsh-purslane 67
- Spiny Naiad 67
- South American Elodea 68
- Water-purslane 68
- Creeping Rush 69
- Micranthemum 70
- Mayaca 70

Plants with threadlike to ribbonlike leaves scattered singly on flexible underwater stems, but often paired or bunched toward the stem tips; a few kinds also with oblong to oval floating leaves 71-80
- Threadleaf Pondweed 71
- Sago Pondweed 72
- Widgeongrass 73
- Bigsheath Pondweed 74
- Slender Pondweed 75
- Fries Pondweed 75
- Flatstem Pondweed 76
- Ribbonleaf Pondweed 76
- Leafy Pondweed 77
- Bluntleaf Pondweed 77
- Snailseed Pondweed 78
- Alga Pondweed 78
- Fern Pondweed 79
- Water-stargrass 79
- Vasey Pondweed 80
- Western Pondweed 80

Page

Plants with lance-shaped to oval leaves scattered singly on flexible underwater stems, but often paired or bunched toward the stem tips; some kinds also with oblong to oval floating leaves 81-86
- Red Pondweed 81
- Variable Pondweed 82
- Whitestem Pondweed 83
- Redhead-grass 84
- Bigleaf Pondweed 85
- Curly Pondweed 86

Plants with lance-shaped to round floating leaves which are tapered to slightly notched at the base; some kinds also with threadlike to oval underwater leaves; and some kinds also growing partly out of water 87-100
- Floating Pondweed 88
- Oakes Pondweed 88
- Water Smartweed 89
- Marsh Smartweed 90
- Bog Pondweed 91
- Watershield 91
- Longleaf Pondweed 92
- Broadleaf Waterplantain 93
- Roundleaf Bacopa 94
- Heartleaf Pondweed 94
- American Lotus 95
- Upright Burhead 96
- Longleaf Mudplantain 97
- Goldenclub 97
- Damasonium 98
- Watergrass 98
- Amphianthus 99
- Salvinia 99
- Ottelia 100

Page

Plants with lance-shaped to round floating leaves which are deeply notched at the base; a few kinds also growing partly out of water 101-110
Spatterdock 102
Floating Caltha 103
Northern Waterlily 103
Northern Arrowhead 104-105
White Waterlily 105
Little Floatingheart 106
European Frogbit 106
Roundleaf Mudplantain 107
Yellow Floatingheart 107
American Frogbit 108
Big Floatingheart 109
Banana Waterlily 110
Blue Waterlily 110
Plants with coarse-toothed, lobed, or divided floating leaves; some kinds also growing partly out of water 111-114
Arctic Buttercup 111
Marsileas 112
Ivyleaf Buttercup 113
Floating Buttercup 113
Lobb Buttercup 113
Waterchestnut 114
Little, free-floating plants 115-118
Star Duckweed 115
Little Duckweeds 115
Big Duckweeds 116
Watermeals 116
Riccia 117
Ricciocarpus 117
Water-velvets 117
Eastern Wolffiella 118
Tongue Wolffiella 118

UNDERWATER AND FLOATING-LEAVED PLANTS OF THE UNITED STATES AND CANADA

This is the third of a series of circulars on field identification of North American marsh and water plants. It describes all of the wild flowering plants, ferns, liverworts, and Characeae in which the foliage is habitually under water or floating, and all those which have underwater or floating-leaved forms, and which, at the same time, have characteristics by which a person can tell them apart with the naked eye. If the different kinds cannot be told apart without a hand lens or microscope or when they are without flowers or seeds, only group descriptions are given.

To use this guide, a person should read pages 1 to 5 and the introductions to each of the twelve groups, and should scan the pictures. Then, to identify a particular plant, he should find the group and the picture which match it, and read the description which goes with that picture. If the picture and description fit the plant, a name has been found for it.

These plants range from pinhead-size to twenty feet long. Most of the pictures are life-size or half life-size, as indicated; but many show no more than a sprig of a much-branched plant. This tells little of how an entire plant looks, or how dense patches look. But a person usually sees water plants from above them, then breaks off a piece for a closer look; or he salvages an already broken piece. So what is pictured here should be enough for identification.

Each description is headed with a common name and a scientific name. Under some of these headings, in parentheses, are one or more other scientific names which are used for the same plant in three commonly used manuals: Merritt Lyndon Fernald's "Gray's Manual of Botany, Eighth Edition" (1950); Herbert L. Mason's "A Flora of the Marshes of California" (1957); and John Kunkel Small's "Manual of the Southeastern Flora" (1933).

Seeds and rootstocks of many Pondweeds and of Widgeongrass, Wildcelery, Eelgrass, and Shoalgrass are important duck foods from fall to spring; and ducks, geese, muskrats, turtles, fish, insects, and other animals make some use of every plant described. When water plants get in the way of boating, swimming, or fishing they are quickly labeled "weeds". Then it's worth remembering that they protect bottoms from currents which stir up mud and sand, protect shores from waves, give fish places where temperatures are moderate and there is plenty of food and oxygen, and are interesting and beautiful.

Underwater plants are abundant in shallow, clear, still or slow-flowing, fresh water from southern British Columbia to southern Quebec, and south to the Great Basin, the Nebraska Sandhills, and the Great Lakes States. They are less common, but still in great variety, northwest to Alaska, northeast to Newfoundland, and east through New England. Farther north, short summers eliminate most of them. South of the main area they are only locally common because the water in most places is muddier, warmer, or more fluctuating than they can bear.

A few kinds (Eelgrass, Surfgrass, Shoalgrass, Manateegrass, Turtlegrass, and Halophilas) grow only in salt water in coastal bays, rivers, and creeks. Ribbonlike or threadlike green leaves distinguish them from the algae which grow nearby. Widgeongrass, Sago Pondweed, Horned-pondweed, Redhead-grass, and Eurasian Watermilfoil grow both inland and in fresh to brackish coastal water; and a larger number of mainly inland plants reach the coast in fresh to slightly brackish water.

Floating-leaved plants are occasional in fresh to slightly brackish water nearly everywhere that underwater plants are abundant or common. They are also common south along the Atlantic and Gulf Coastal Plain.

About half of the kinds of plants described here have flexible underwater stems which grow vertically, slantwise, or horizontally, and are thinly to densely covered with leaves or branchlets (Groups 3 to 8). The stems and foliage of most of these plants are so limp that when taken out of water for a closer look they slump into a characterless mass. To separate leaves and leaflets, a person can lay the plant flat and splash water over it; put it in a shallow dish of water; or shake the leaves apart after they have half-dried.

About one-fourth of the plants described grow under water, but have short stems or limp to stiff leaves coming up from the bottom (Groups 1 and 2).

Another fourth have leaves which float at the ends of stalks which come from the bottom or from flexible underwater stems, or leaves which float free of any attachment (Groups 9 to 12).

Many of the plants do not grow exclusively under water or on its surface. Some are under water as seedlings, and later produce floating leaves or out-of-water leaves. In others, the spring growth from over-wintering underground parts is under water; the mature growth reaches the surface of the water or above it. Some kinds have underwater, floating-leaved, and out-of-water forms which look so different that it is hard to believe they are related.

Floods temporarily submerged many kinds of plants that habitually live out of water and that cannot survive long under it. These are omitted.

The plants are discussed in twelve groups, each group beginning with northern inland plants and continuing through southern inland to strictly coastal ones.

Group 1. Plants with limp, threadlike to ribbonlike leaves coming up from the bottom or from short vertical stems; sometimes partly floating (pages 5-13)

Slender Spikerush (see Group 2)
Burreeds
Quillworts (see Group 2)
Arrowheads (see Groups 2 & 10)
Northern Mannagrass & Wildrice
Water Bulrush
Narrowleaf Waterplantain
Wildcelery
Flowering-rush
Eelgrass
Surfgrass
Shoalgrass
Manateegrass
Turtlegrass

Group 2. Plants with rather stiff, short leaves or nearly leafless stems in clumps or patches on the bottom; some kinds sometimes out of water (pages 14-30)

Slender Spikerush
Creeping Buttercup
Quillworts
Subularia
Arrowheads
Limosella
Water Lobelia
Dwarf Spikerush
Littorella
Leafless Watermilfoil
Pipeworts
Bog Rush
Horned Bladderwort
Zigzag Bladderwort
Lavender Bladderwort
Flowering-quillwort
Pillwort
Western Lilaeopsis
Eastern Lilaeopsis
Gulf Halophila
Caribbean Halophila

Group 3. Plants with featherlike, usually limp leaves on flexible underwater stems; stem tips often sticking out of water (pages 31-42)

Northern Watermilfoil
Little Watermilfoil
Whorled Watermilfoil
Variable Watermilfoil
Farwell Watermilfoil
Marsh Mermaidweed
Low Watermilfoil
Eurasian Watermilfoil
Parrotfeather
Eastern Watermilfoil
Featherfoil
Andean Watermilfoil
Southern Watermilfoil

Group 4. Plants with fine-forked, limp leaves mixed with small, roundish bladders on flexible underwater stems; flowers sticking out of water (pages 43-50)

Northern Bladderwort
Flatleaf Bladderwort
Common Bladderwort
Hidden-flower Bladderwort
Purple Bladderwort
Eastern Bladderwort
Little Floating Bladderwort
Big Floating Bladderwort
Dwarf Bladderwort
Giant Bladderwort

Group 5. Plants with clustered branches or fine-forked, bladderless, usually limp leaves on flexible underwater stems; stem tips sometimes sticking out of water (pages 51-59)

Muskgrasses, Nitellas & Tolypellas
White Water Buttercup
Yellow Water Buttercup
Coontail
Water-marigold
Lake Cress
Riverweed
Fanwort
Alga Bulrush
Limnophilas

Group 6. Plants with needlelike to oval, paired or bunched leaves on mainly flexible underwater stems; some kinds sometimes out of water (pages 60-70)

Marestail
Water-starworts
Tillaea
Horned-pondweed
Waterworts
Naiads (except Spiny Naiad)
Common Elodea
Goldenpert
Marsh-purslane
Spiny Naiad
South American Elodea
Water-purslane
Creeping Rush
Micranthemum
Mayaca

Group 7. Plants with threadlike to ribbonlike leaves scattered singly on flexible underwater stems, but often paired or bunched toward the stem tips; a few kinds also with oblong to oval floating leaves (pages 71-80)

Threadleaf Pondweed
Sago Pondweed
Widgeongrass
Bigsheath Pondweed
Slender Pondweed
Fries Pondweed
Flatstem Pondweed
Ribbonleaf Pondweed
Leafy Pondweed
Bluntleaf Pondweed
Snailseed Pondweed
Alga Pondweed
Fern Pondweed
Water-stargrass
Vasey Pondweed
Western Pondweed

Group 8. Plants with lance-shaped to oval leaves scattered singly on flexible underwater stems, but often paired or bunched toward the stem tips; some kinds also with oblong to oval floating leaves (pages 81-86)

Red Pondweed
Variable Pondweed
Whitestem Pondweed
Redhead-grass
Bigleaf Pondweed
Curly Pondweed

Group 9. Plants with lance-shaped to round floating leaves which are tapered to slightly notched at the base; some kinds also with threadlike to oval underwater leaves; and some kinds also growing partly out of water (pages 87-100)

Floating Pondweed
Oakes Pondweed
Water Smartweed
Marsh Smartweed
Bog Pondweed
Watershield
Longleaf Pondweed
Broadleaf Waterplantain
Roundleaf Bacopa
Heartleaf Pondweed
American Lotus
Upright Burhead
Longleaf Mudplantain
Goldenclub
Damasonium
Water Arrowhead (see Group 2)
Watergrass
Amphianthus
Salvinia
Ottelia

Group 10. Plants with lance-shaped to round floating leaves which are deeply notched at the base; a few kinds also growing partly out of water (pages 101-110)

Spatterdock
Floating Caltha
Northern Waterlily
Northern Arrowhead
White Waterlily
Little Floatingheart
European Frogbit
Roundleaf Mudplantain
Yellow Floatingheart
American Frogbit
Big Floatingheart
Banana Waterlily
Blue Waterlily

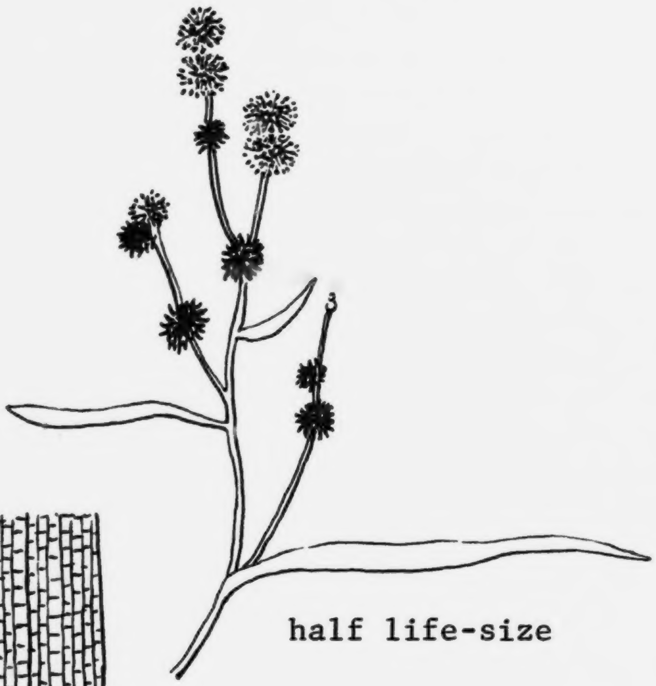
Group 11. Plants with coarse-toothed, lobed, or divided floating leaves; some kinds also growing partly out of water (pages 111-114)

Arctic Buttercup
Marsileas
Ivyleaf Buttercup
Floating Buttercup
Lobb Buttercup
Waterchestnut

Group 12. Little, free-floating plants (pages 115-118)

Star Duckweed
Little Duckweeds
Big Duckweeds
Watermeals
Riccia
Ricciocarpus
Water-velvets
Eastern Wolffiella
Tongue Wolffiella

Group 1. PLANTS WITH LIMP, THREADLIKE TO RIBBONLIKE LEAVES COMING UP FROM THE BOTTOM OR FROM SHORT VERTICAL STEMS; SOMETIMES PARTLY FLOATING grow in fresh inland water and in fresh to salt coastal water. The leaves are upright or nearly so in deep water, trail under or on the surface in shallow water, and sometimes are exposed on mud at low tide. Except in very young plants, the leaves vary from several inches to several feet long. Flowers are often absent.



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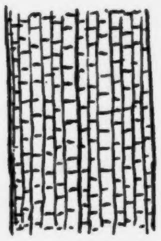

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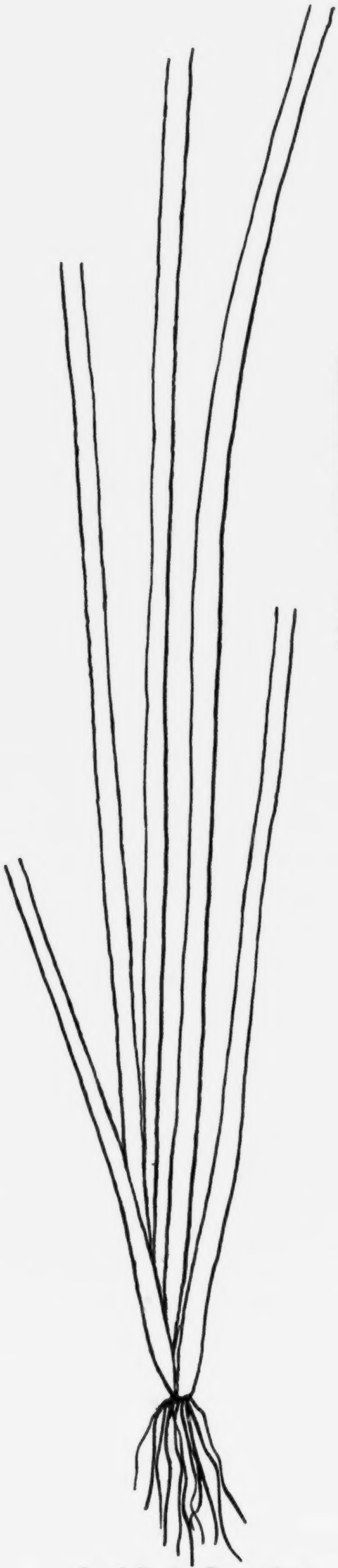

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BURREEDS, Sparganium

Fresh water, inland and coastal; Alaska to Greenland, California, and Florida.

Nine kinds of Burreed have early leaves which are limp and under water. When full-grown, the long ends of the leaves of one kind and sometimes those of several others float side by side or in tangles; the leaves of the remainder stand above water or mud. The underwater and floating leaves resemble the early leaves of Northern Mannagrass and Wildrice and the leaves of Wildcelery and a form of Water Arrowhead; but can be told from them by holding a piece of leaf to the light and comparing it with the piece-of-leaf picture to the left and those on pages 7, 10, and 21. When they mature, Burreeds can be told apart by differences in their prickly-looking seed balls and differences in their seeds.

The nine kinds are:

Sparganium americanum. Ontario to Newfoundland, Texas, and Florida. Mature leaves sometimes floating.

Sparganium androcladum. Minnesota to Quebec, Oklahoma, and Virginia.

Sparganium angustifolium (Sparganium multipedunculatum and simplex). Alaska to Greenland, California, New Mexico, Minnesota, and New Jersey. Mature leaves often floating.

Sparganium chlorocarpum. Alaska to Newfoundland, California, Iowa, and North Carolina.

Sparganium eurycarpum. British Columbia to Quebec, California, Kansas, and Virginia.

Sparganium fluctuans. British Columbia to Saskatchewan and Idaho; and Minnesota to Newfoundland and Pennsylvania. Mature leaves floating.

Sparganium glomeratum. Minnesota and Quebec. Mature leaves often floating.

Sparganium hyperboreum. Alaska to Greenland, Manitoba, and Nova Scotia. Mature leaves often floating.

Sparganium minimum. Alaska to Newfoundland, New Mexico, and Pennsylvania. Mature leaves sometimes floating.

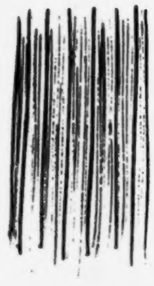
NORTHERN MANNAGRASS, Glyceria borealis

Fresh water; Alaska to Newfoundland, California, New Mexico, and Pennsylvania.

WILDRICE, Zizania aquatica

Fresh water, inland and coastal; Manitoba to Nova Scotia, Texas, and Florida; and rarely run wild from plantings in the Far West (Alberta to California).

Young plants of each kind have ribbonlike underwater leaves with long floating ends. These resemble the underwater and floating leaves of Burreeds and the leaves of Wildcelery and a form of Water Arrowhead; but can be told from them by holding a piece to the light and comparing it with the piece-of-leaf picture to the right and those on pages 6, 10, and 21. Mature plants have leafy stems which stand above water or mud.



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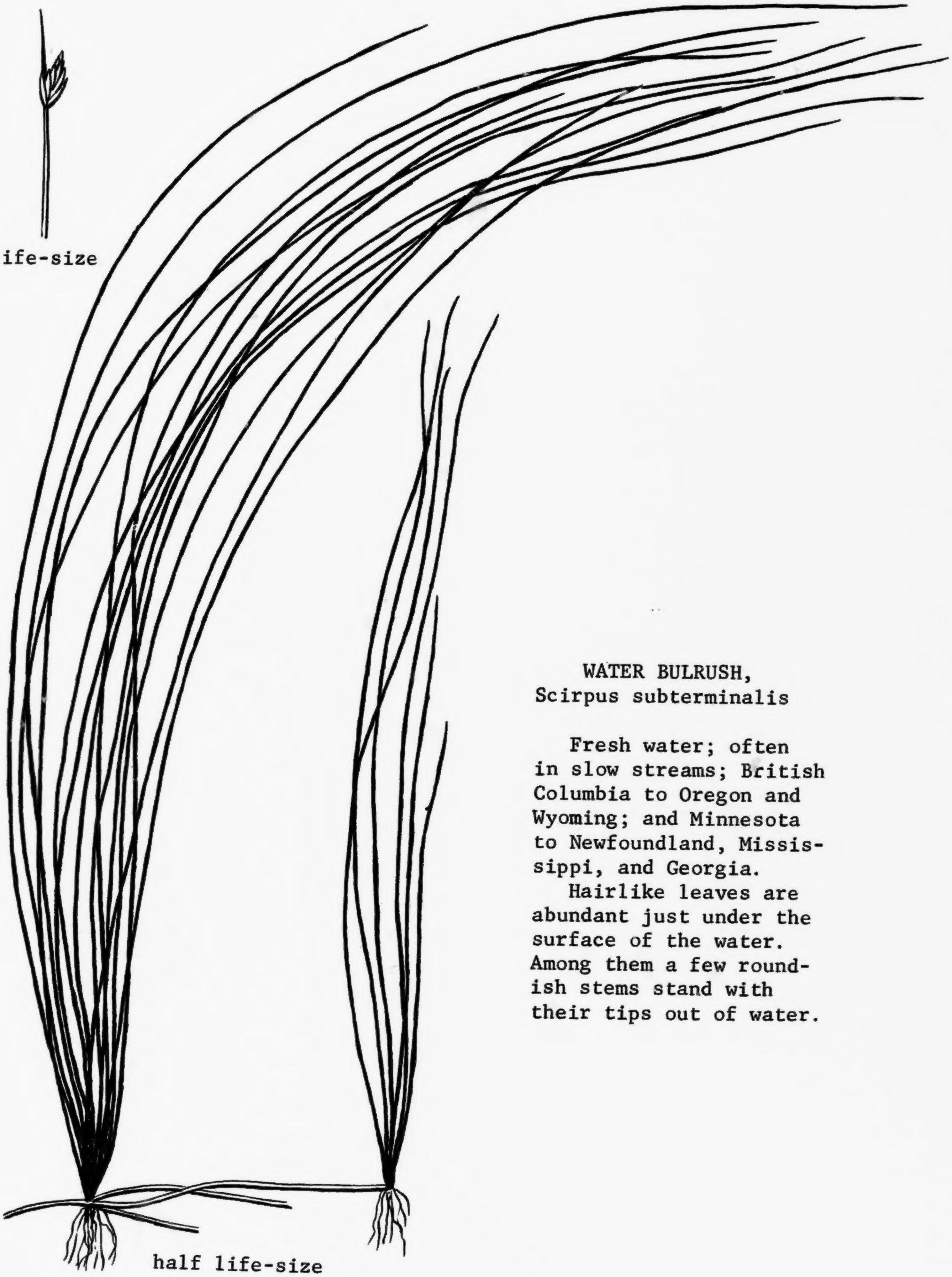
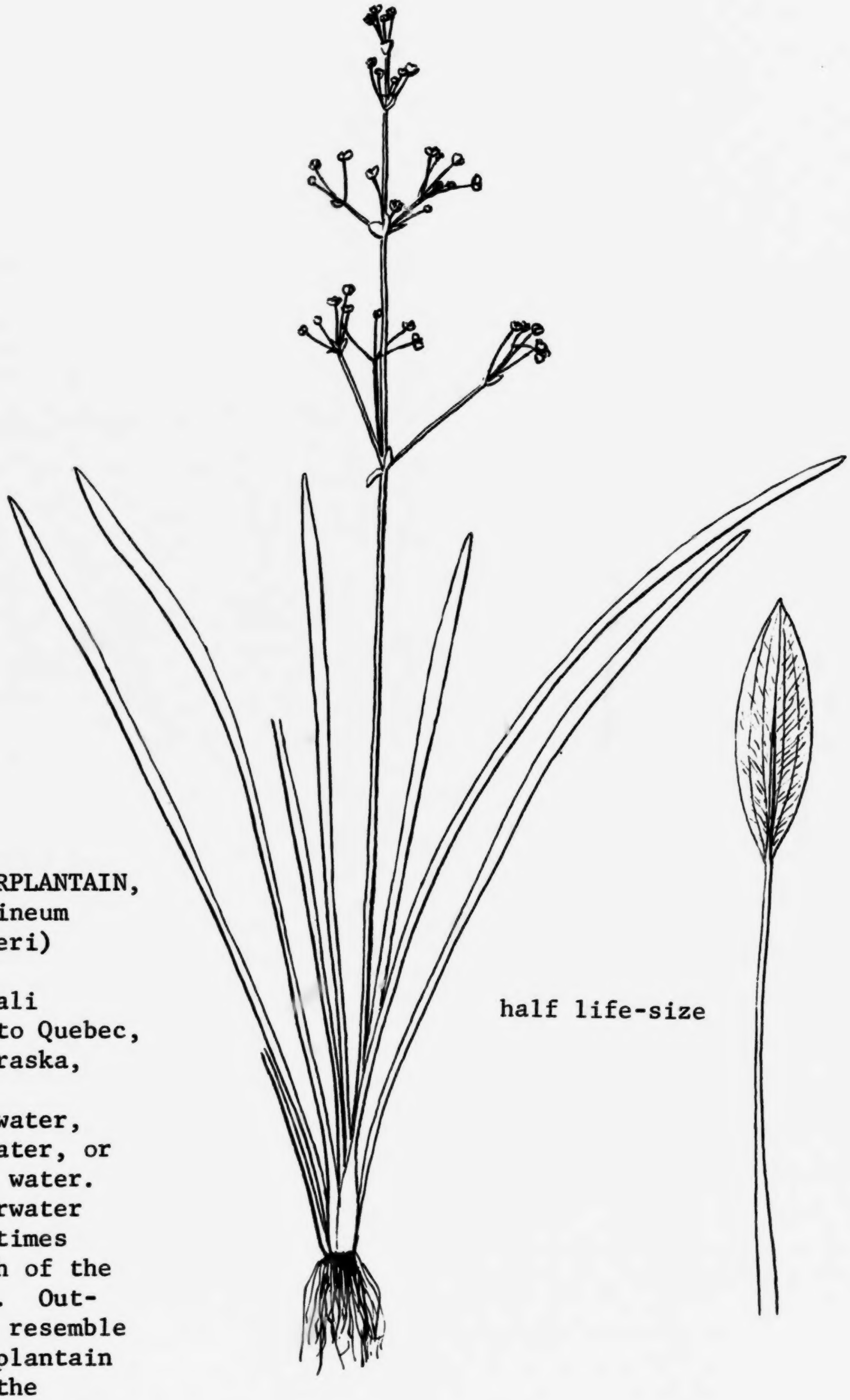


WATER BULRUSH,
Scirpus subterminalis

Fresh water; often in slow streams; British Columbia to Oregon and Wyoming; and Minnesota to Newfoundland, Mississippi, and Georgia.

Hairlike leaves are abundant just under the surface of the water. Among them a few roundish stems stand with their tips out of water.



NARROWLEAF WATERPLANTAIN,
Alisma gramineum
(Alisma geyeri)

Fresh or alkali water; Alberta to Quebec, California, Nebraska, and Vermont.

Grows under water, partly out of water, or entirely out of water. Ribbonlike underwater leaves are sometimes twice the length of the flower clusters. Out-of-water plants resemble Broadleaf Waterplantain (page 93); but the leaves have a tapering base, and the clusters of flowers are often shorter than the leaves.

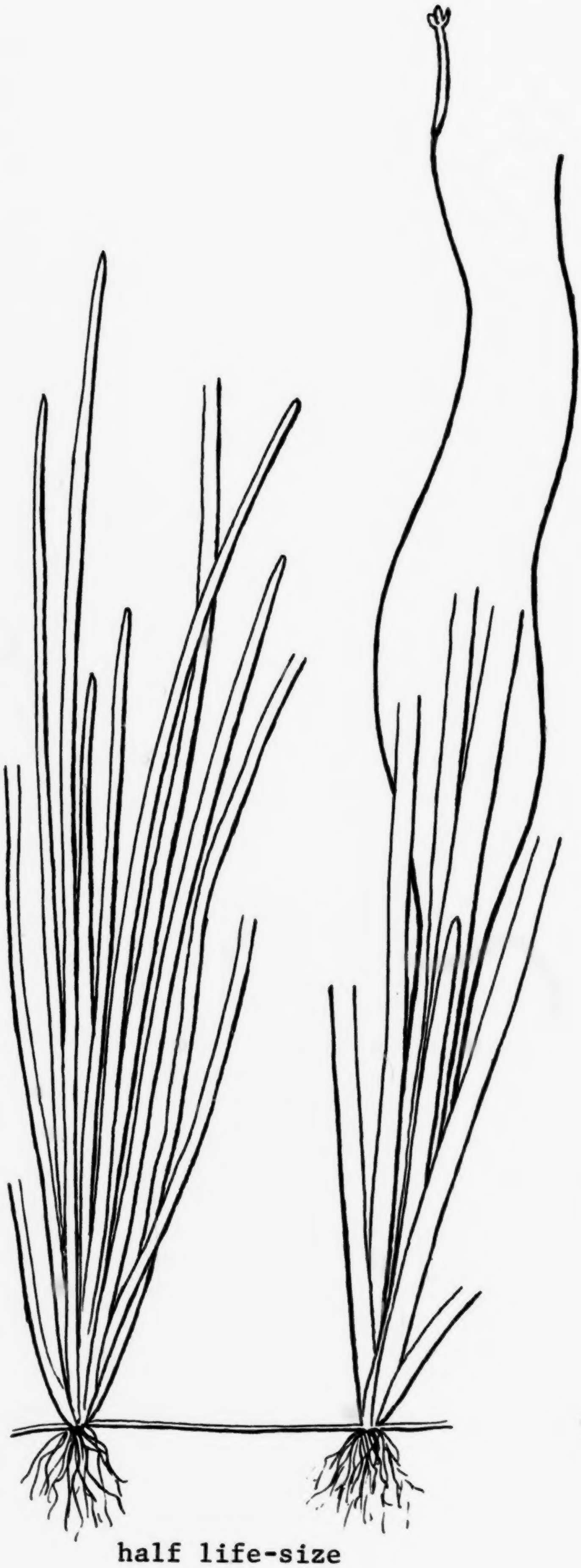
WILDCELERY.

Vallisneria americana
(Vallisneria spiralis)

Fresh inland water and fresh to slightly brackish coastal water; Manitoba to Nova Scotia, Texas, and Florida; and rarely run wild from plantings in the Far West (Washington to Arizona).

Leaves, which are sometimes several feet long, have a fine-veined, light-colored center stripe. In summer the plants have long-stalked, cylindric pods.

The leaves resemble those of a form of Water Arrowhead, the underwater and floating leaves of Burreeds, and the early leaves of Northern Mannagrass and Wildrice; but can be told from them by holding a piece of leaf to the light and comparing it with the piece-of-leaf picture to the left and those on pages 6, 7, and 21.



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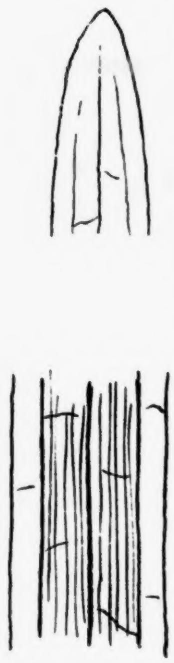

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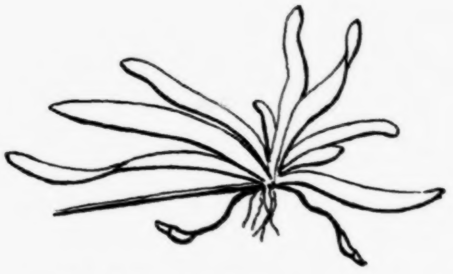

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FLOWERING-RUSH,
Butomus umbellatus

Not pictured.

A native of Europe which was discovered along the tidal St. Lawrence River about 1900 and now grows in fresh water in Idaho; and Michigan to Quebec, Illinois, and Vermont.

Usually stands above shallow water or mud, with knee-high or higher narrow, upright leaves surrounding a stalk topped with a loose cluster of pink, 6-parted flowers. These are about 3/4 inch across.

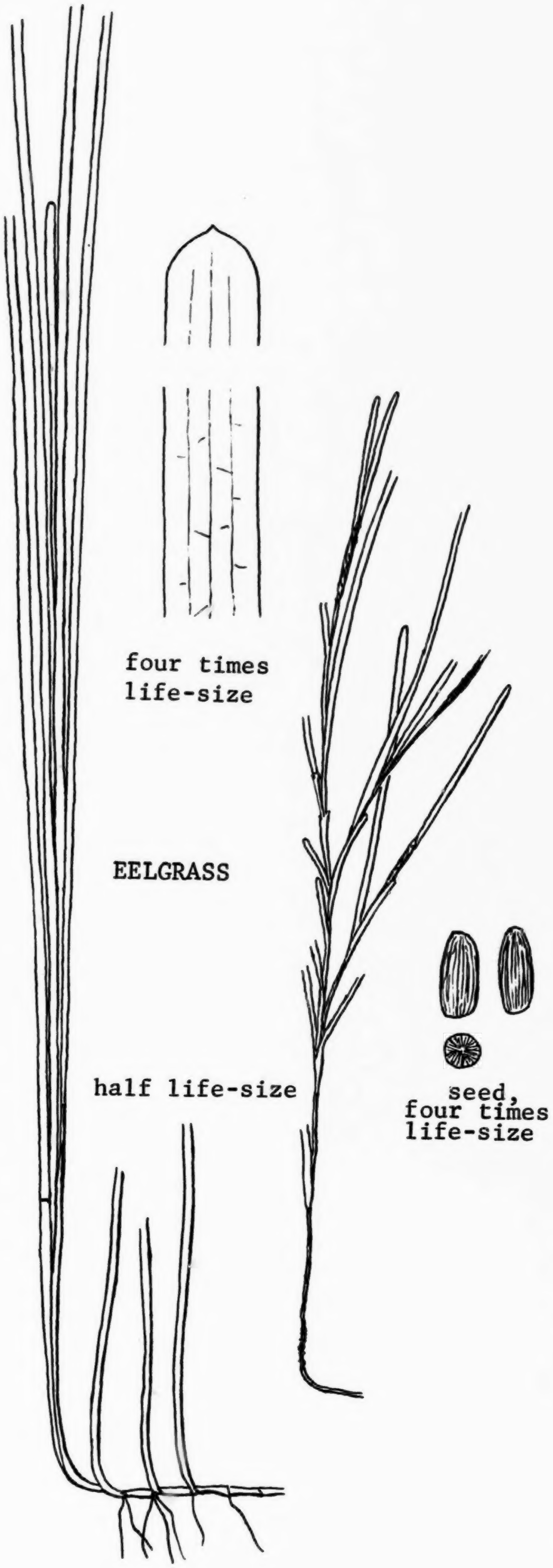
In deeper water, has only limp leaves which do not reach above the surface. These resemble the leaves of Burreeds and Wildcelery, but are usually narrower and less translucent and appear less veiny (see the piece-of-leaf pictures on pages 6 and 10).

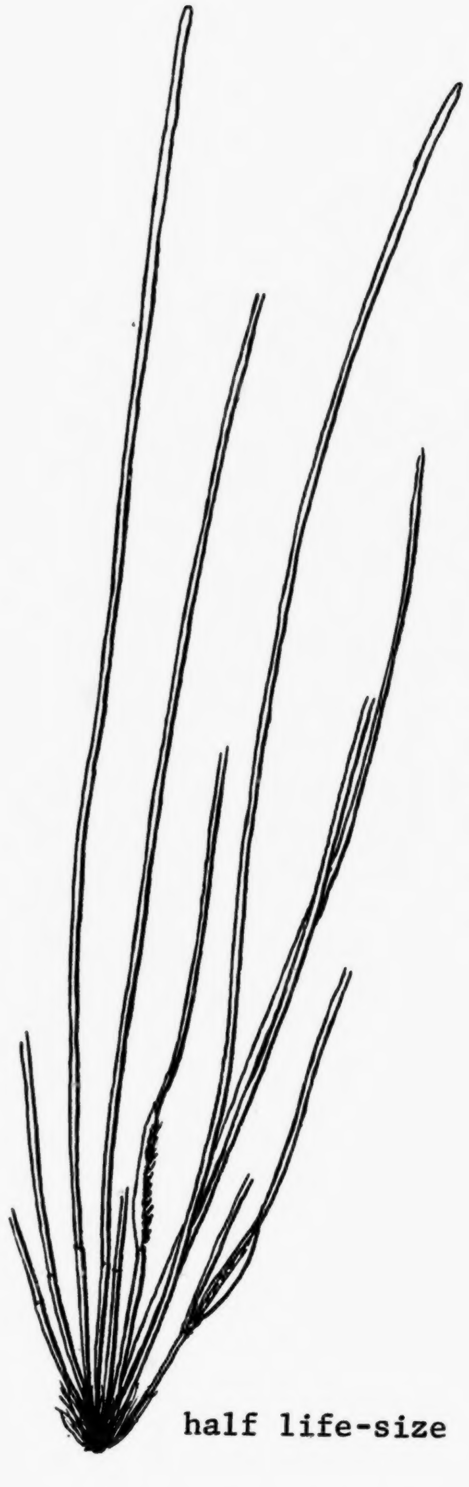
EELGRASS, Zostera marina

Salt water; Alaska to California; and Hudson Bay to North Carolina.

Often in dense beds in soft-bottomed bays. Some bays are so shallow that most of the water drains out at low tide; and for a while the ribbonlike foliage is left sprawling on the mud. Seeds are half-hidden in a long row in leaf sheaths.

Narrow-leaved plants resemble Shoalgrass (page 12), with which it grows in North Carolina; but Eelgrass leaves have a roundish tip.





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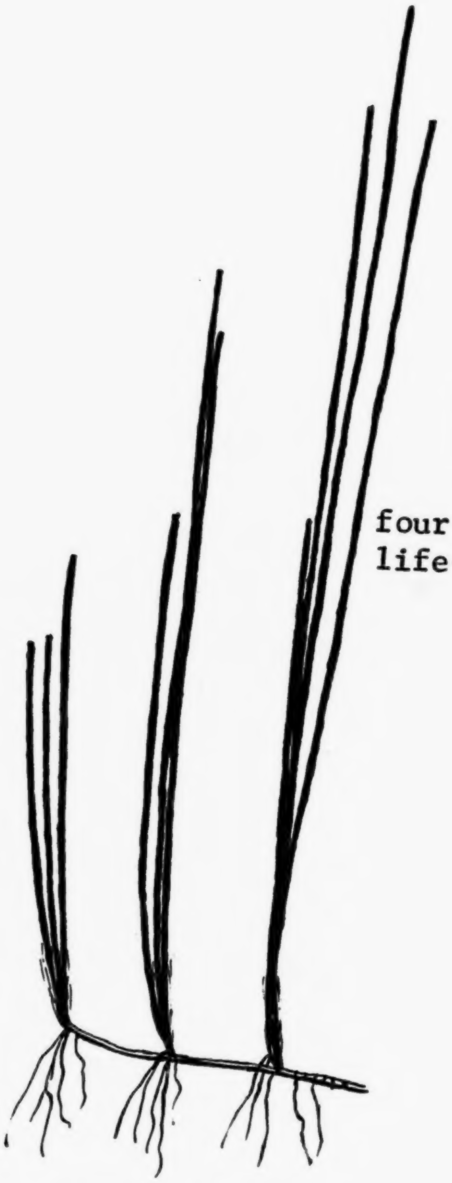
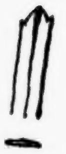
SURFGRASS, Phyllospadix scouleri
(Phyllospadix torreyi)

Salt water; British Columbia to California.

Flowers are sometimes in several clusters on a much longer stalk than the ones pictured.





four times
life-size

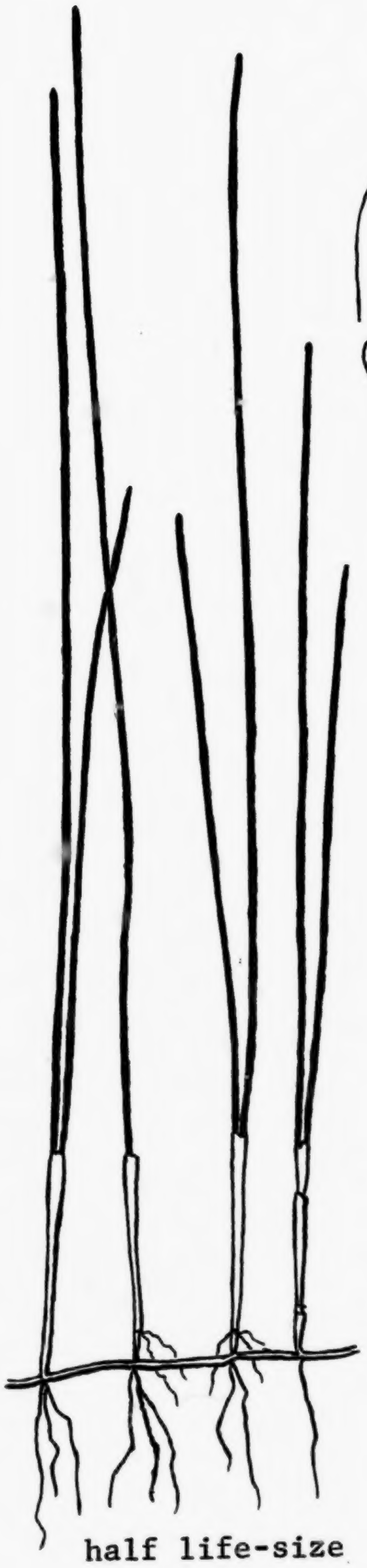
half life-size

SHOALGRASS, Halodule wrightii

Salt water; North Carolina; and Texas to Florida.

Leaves flat in cross-section. Flowers scarce.

Resembles narrow-leaved plants of Eelgrass (page 11), with which it grows in North Carolina; but has a 3-pointed leaf tip which could be mistaken for a broken end. Resembles Manateegrass (page 13); but has flat leaves with a 3-pointed tip.



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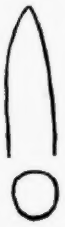

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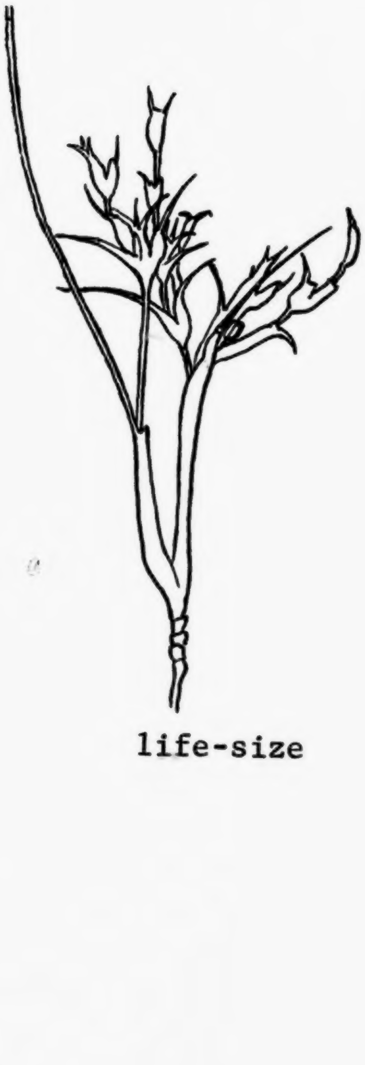

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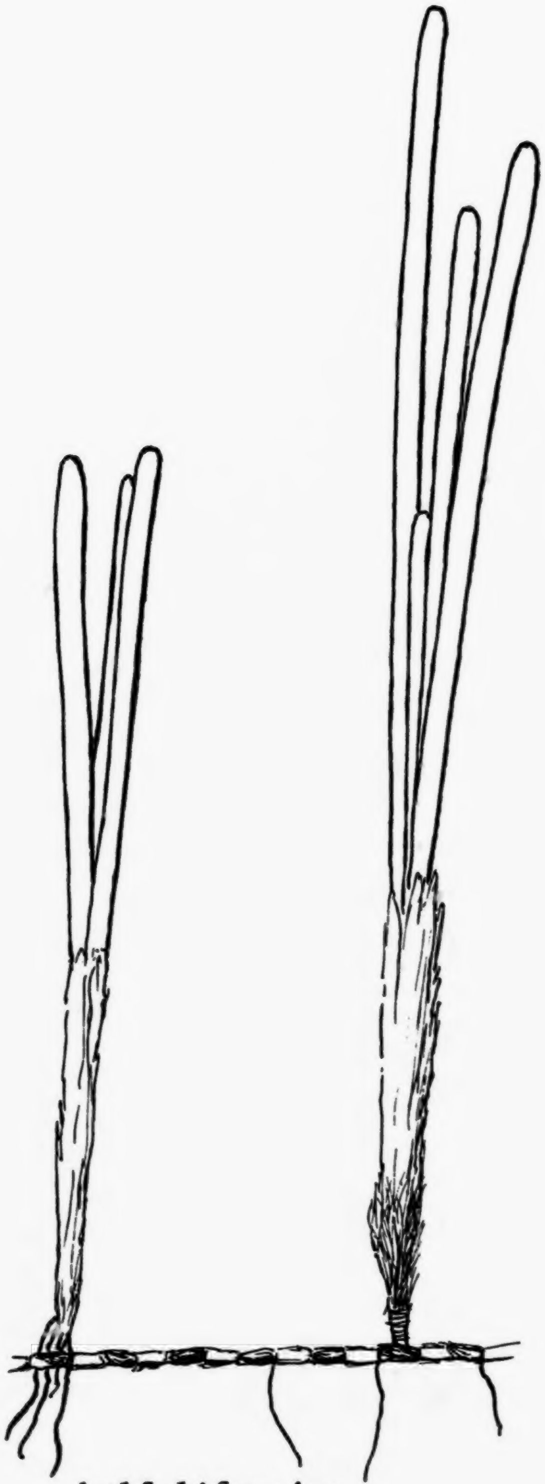


half life-size

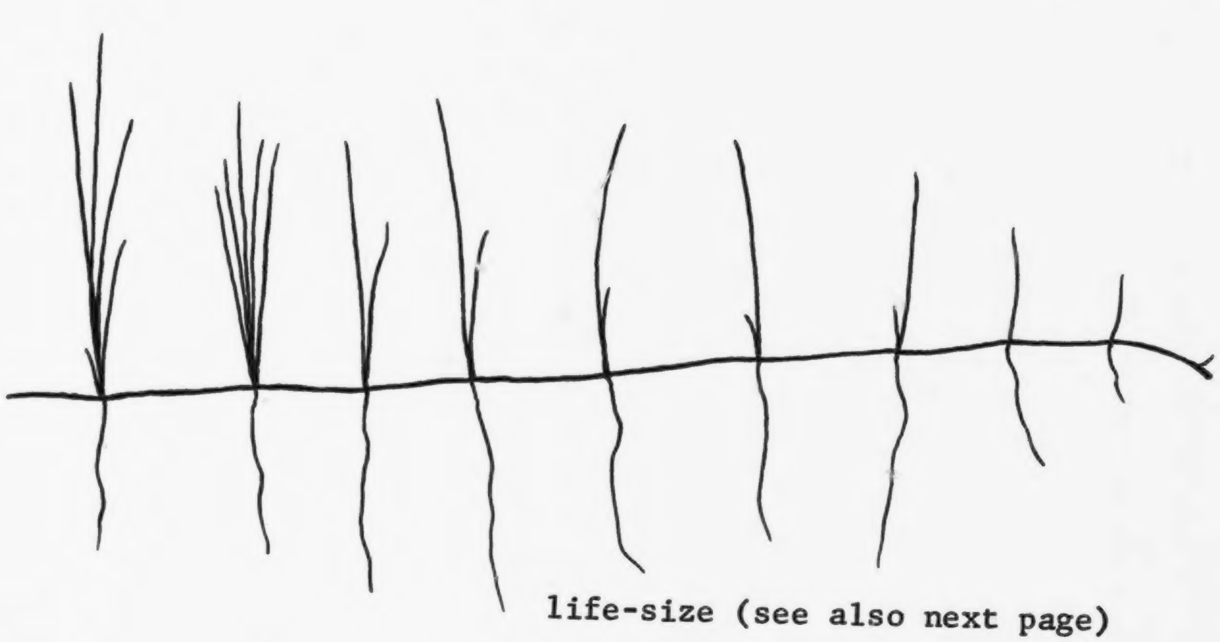
MANATEEGRASS, Cymodocea manatorum

Salt water; Texas to Florida.
Leaves round in cross-section.
Flowers common.
Resembles Shoalgrass (page 12); but has round leaves with a blunt tip.

TURTLEGRASS,
Thalassia testudinum

Salt water; Texas to Florida.

Group 2. PLANTS WITH RATHER STIFF, SHORT LEAVES OR LEAFLESS STEMS IN CLUMPS OR PATCHES ON THE BOTTOM; SOME KINDS SOMETIMES OUT OF WATER grow in fresh inland water and in fresh to salt coastal water. The leaves vary from upright to nearly horizontal, and usually are no more than a few inches long. Plants grow all the way to shore from depths of several feet. Flowers are often absent.



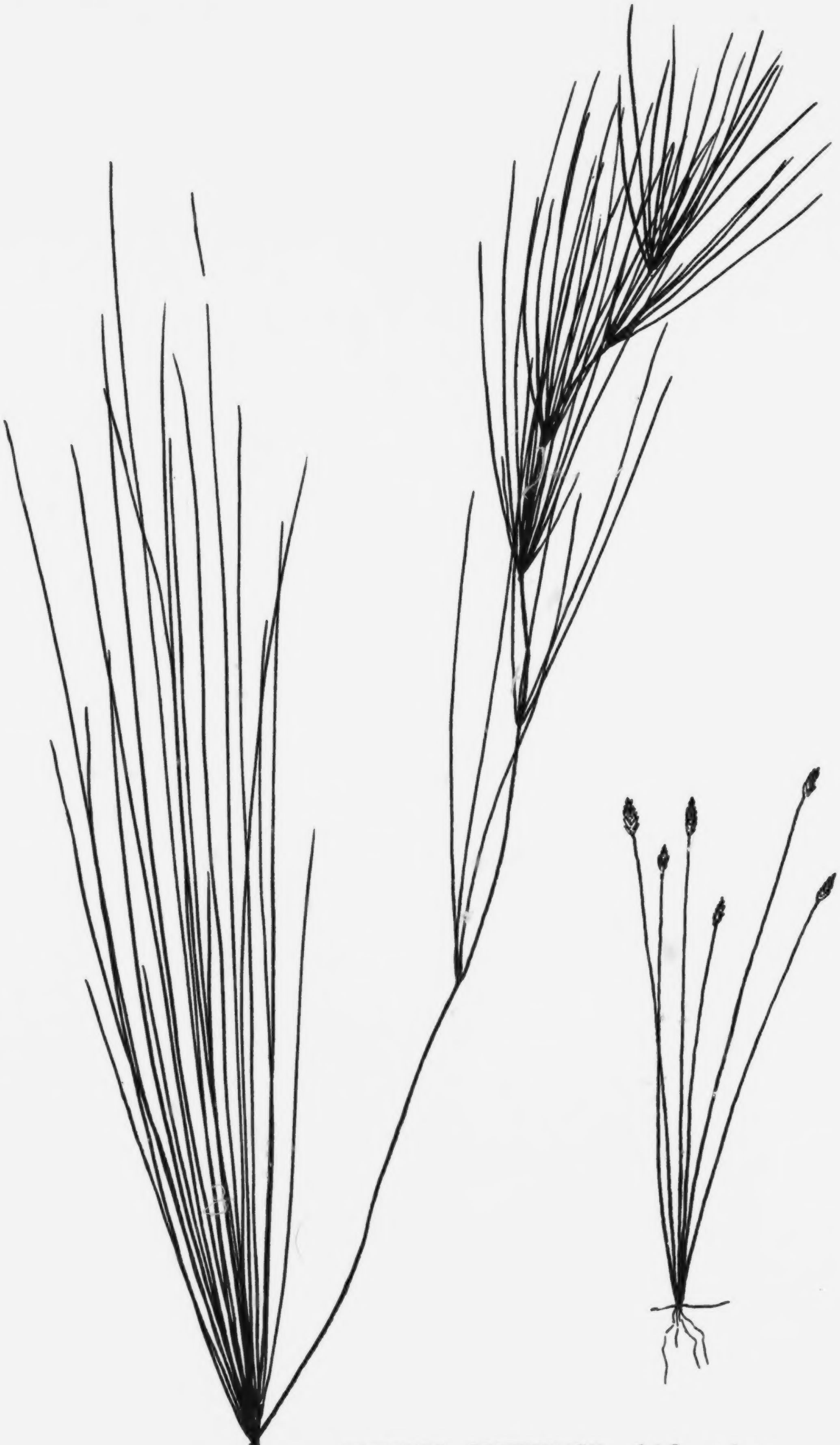
life-size (see also next page)

SLENDER SPIKERUSH, Eleocharis acicularis

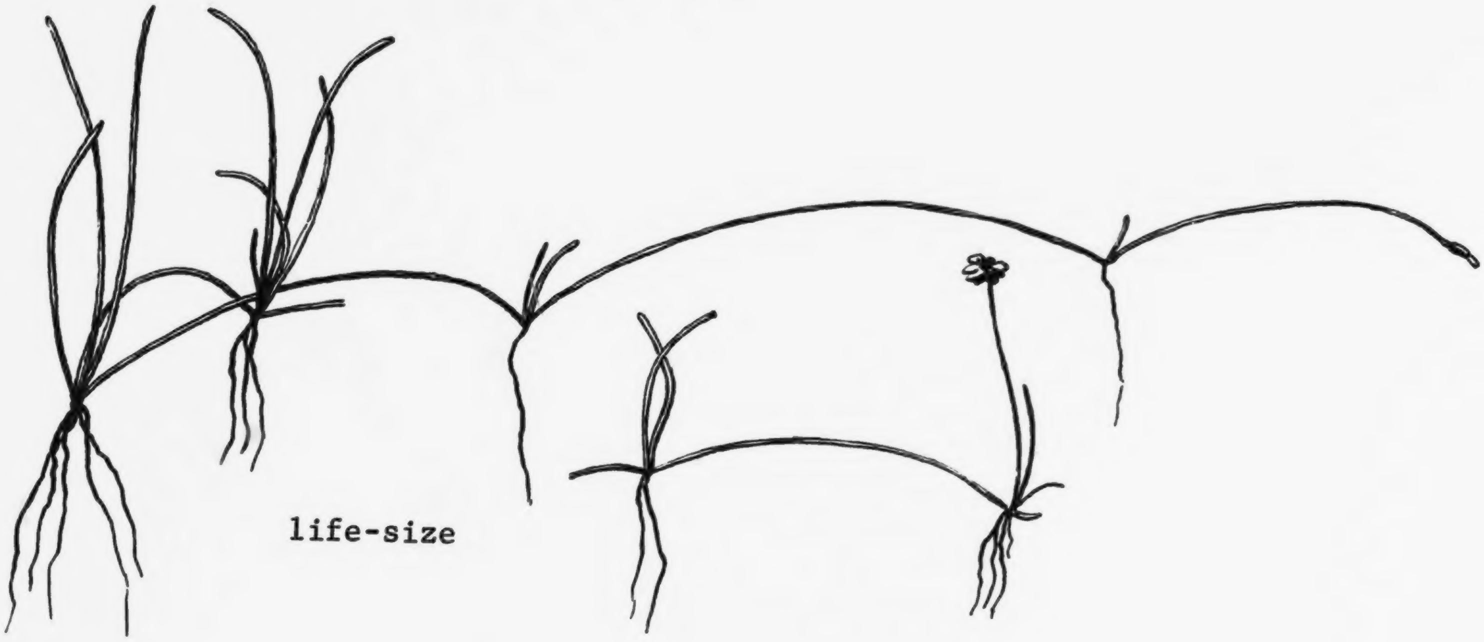
Fresh water; Alaska to Greenland, California and Florida.

Usually on wet shores and in marshes, growing as a turf of fine green stems which, in summer, are topped with brown flower heads. Often under water, where the stems are longer and do not bloom. In streams, displaced rootstocks sometimes trail and produce still longer stems.

Resembles Dwarf Spikerush (page 23); but Slender Spikerush has thinner stems and is not known to produce tubers or to grow in brackish coastal marshes.



SLENDER SPIKERUSH, life-size
(see also preceding page)

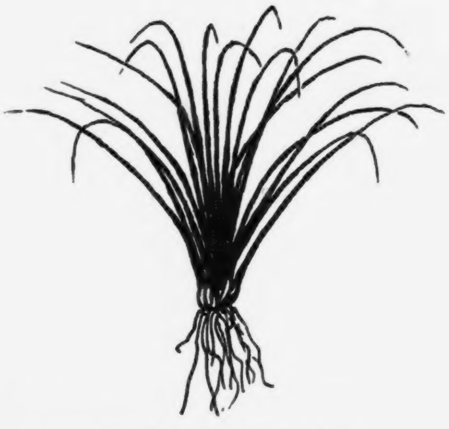


CREEPING BUTTERCUP, Ranunculus flammula
(Ranunculus reptans)

Fresh water; Alaska to Greenland, California, New Mexico, Minnesota, and Pennsylvania.

Grows either under water or on wet shores. Leaves are connected by above-ground runners. Out-of-water plants have yellow flowers.

QUILLWORTS, Isoetes



Fresh inland water and fresh to slightly brackish coastal water; Alaska to Greenland, California, and Florida.

Quillworts resemble each other so much that they can be told apart only by using a microscope to look at the markings on spores pocketed in the base of leaves. Thirteen kinds vary considerably in size, number of leaves, and stiffness of leaves (sometimes they are long and limp); but some vary almost as much within themselves. Occasionally they grow partly or entirely out of water.

The thirteen kinds are:

Isoetes bolanderi. British Columbia to Alberta, California, Arizona, and Colorado.

Isoetes eatoni. New Hampshire to New Jersey.

Isoetes engelmanni. Missouri to New Hampshire, Alabama, and Georgia.

Isoetes flaccida. Georgia and Florida.

Isoetes foveolata. New Hampshire to Connecticut.

Isoetes howellii. Washington to Montana and California.

Isoetes macrospora. Minnesota to Newfoundland and Virginia.

Isoetes melanopoda (Isoetes butleri, melanospora, and virginica). South Dakota to Virginia, Texas, and Georgia.

Isoetes muricata (Isoetes braunii). Alaska to Greenland, California, Colorado, Minnesota, and New Jersey.

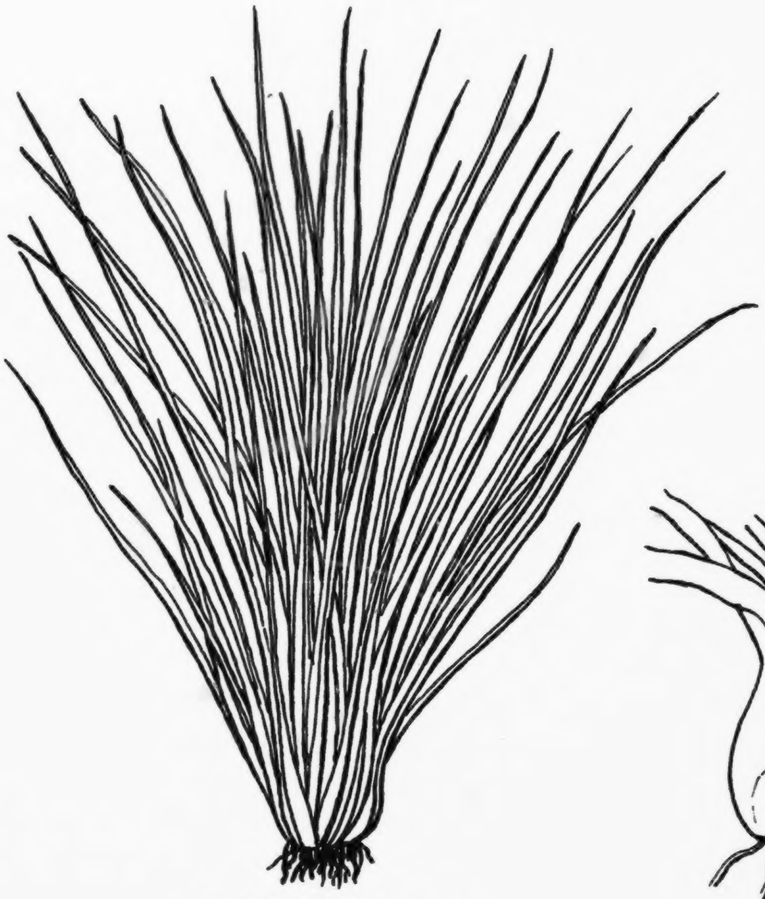
Isoetes nuttallii (Isoetes orcuttii). Washington to Idaho and California.

Isoetes occidentalis. Washington to Colorado and California.

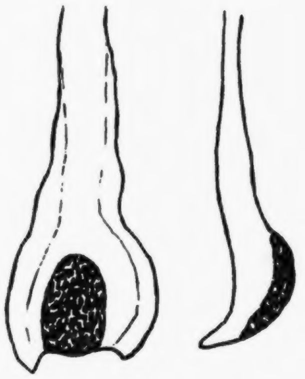
Isoetes riparia (Isoetes saccharata). Michigan to Newfoundland and North Carolina.

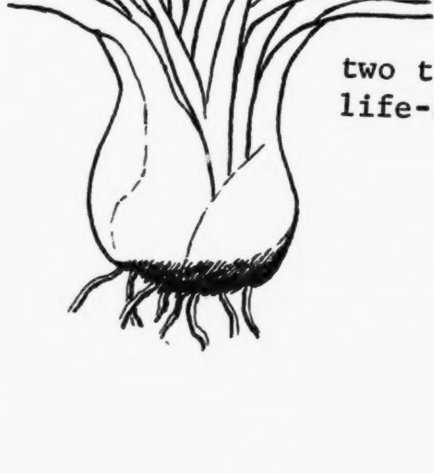
Isoetes tuckermani. Quebec to Newfoundland, New York, and Connecticut.

The smaller Quillworts resemble Littorella (page 23) and Pillwort (page 28); but Quillwort leaves have a much-enlarged base, and clumps of leaves are not connected by rootstocks. The smaller Quillworts resemble Pipeworts (page 25); but Quillwort leaves taper only a little from the much-enlarged base, and their roots are not closely crosslined.

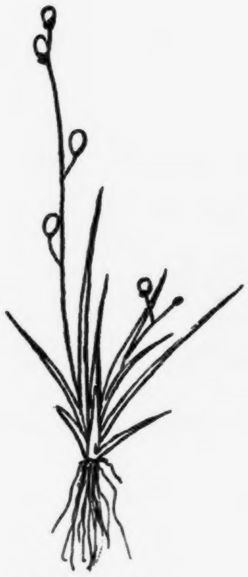


half life-size





two times life-size



life-size

SUBULARIA, Subularia aquatica

Fresh water; Alaska to Quebec, California, Utah, Minnesota, and New York.

Has tiny white flowers and roundish pods, either under water or on wet shores.

Resembles the underwater form of Bog Rush (page 26); but the clumps of leaves are not connected by underground rootstocks, and plants often have flowers or seed pods.

ARROWHEADS, Sagittaria

Fresh water, inland and coastal; Alaska to Quebec, California, and Florida.

Young plants of five kinds of Arrowhead often grow under water as clumps of narrow, stalkless leaves. The leaves may be stiff or limp, short or ribbonlike, blunt-tipped or sharp-tipped, flat or as-thick-as-wide. When they mature, these Arrowheads can be told apart by their leaves and seeds.

The five kinds are:

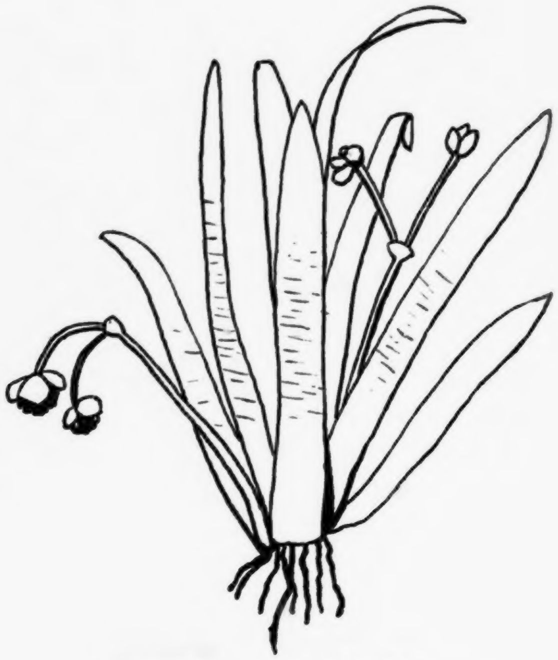
BUR ARROWHEAD, Sagittaria rigida. Not pictured. Manitoba to Quebec, Nebraska, Alabama, and Virginia.

HOODED ARROWHEAD, Sagittaria calycina (Lophotocarpus calycinus and spongiosus). California; and South Dakota to New Brunswick, New Mexico, Louisiana, and North Carolina. In coastal water it matures without much change in shape or size of leaves; and the foliage and flowers are often under water at high tide.

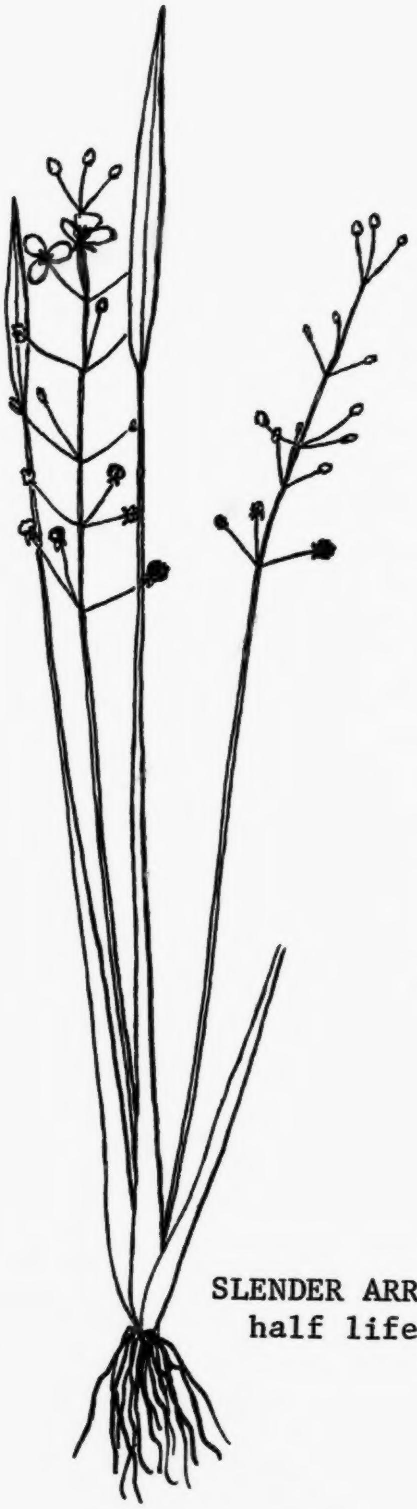
NORTHERN ARROWHEAD, Sagittaria cuneata (see pages 104 and 105).

SLENDER ARROWHEAD, Sagittaria graminea (Sagittaria chapmanii, cristata, cycloptera, eatoni, isoetiformis, macrocarpa, teres, and weatherbiana). South Dakota to Nova Scotia, Texas, and Florida.

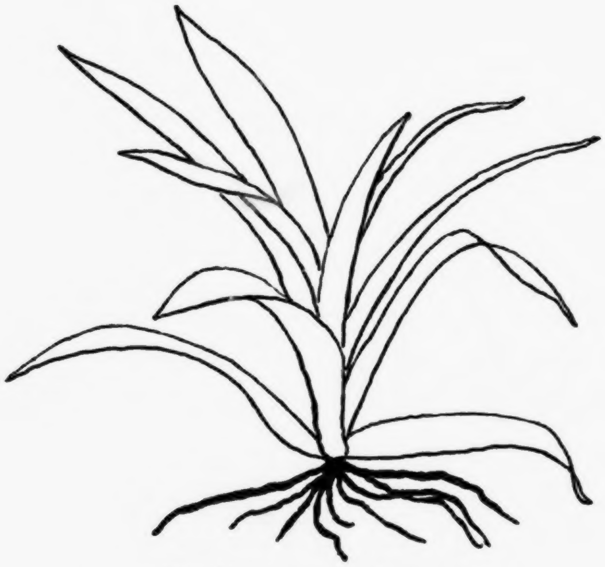
WATER ARROWHEAD, Sagittaria subulata (Sagittaria filiformis, lorata, and stagnorum). Maine to Alabama. In coastal water it matures without much change in shape or size of leaves; and the foliage and flowers are often under water at high tide. This form resembles Limosella (page 22); but Arrowhead clumps are connected by underground rootstocks and eventually produce 3-petaled flowers and balls of exposed seeds. Another form has a cluster of oval floating leaves which resemble some of the plants in Group 9. Still another has ribbonlike leaves which trail just under water. These leaves resemble those of Wildcelery, the underwater and floating leaves of Burreeds, and the early leaves of Northern Mannagrass and Wildrice; but can be told from them by holding a piece to the light and comparing it with the piece-of-leaf picture on page 21 and those on pages 6, 7, and 10.



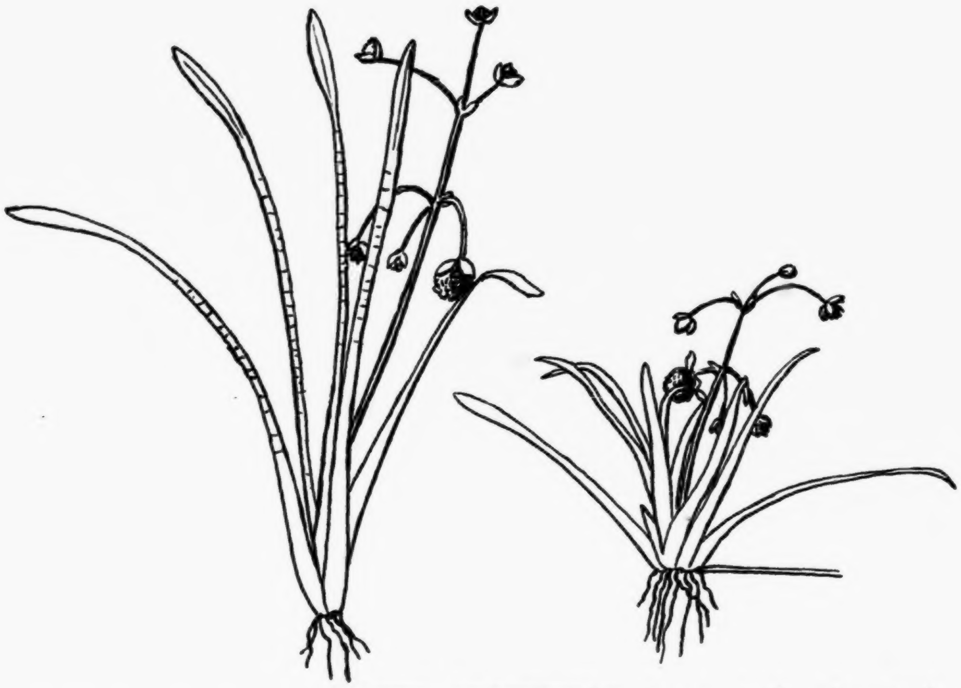
HOODED ARROWHEAD
(small coastal plant),
life-size



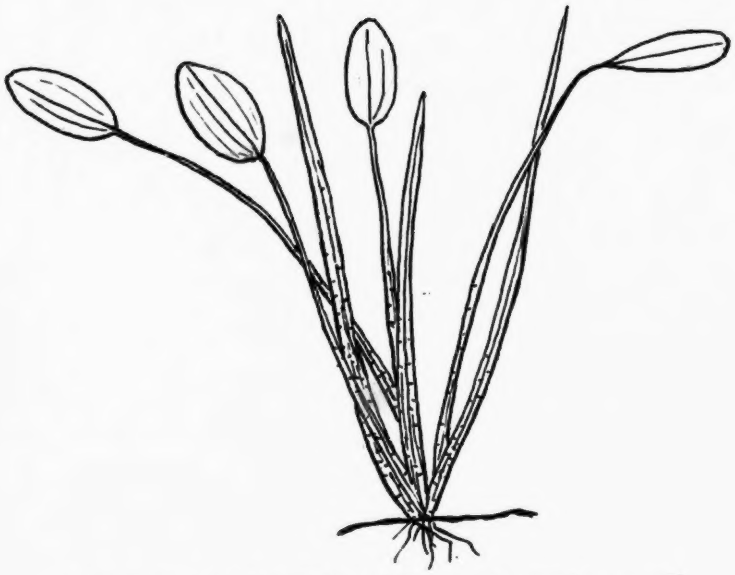
SLENDER ARROWHEAD,
half life-size



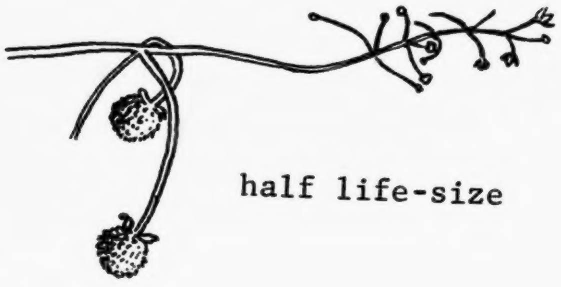
SLENDER ARROWHEAD
(young plant), life-size



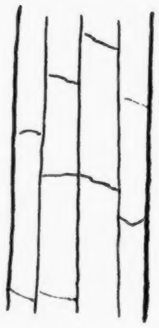
WATER ARROWHEAD (coastal plants),
life-size



WATER ARROWHEAD (floating-leaved),
half life-size



half life-size



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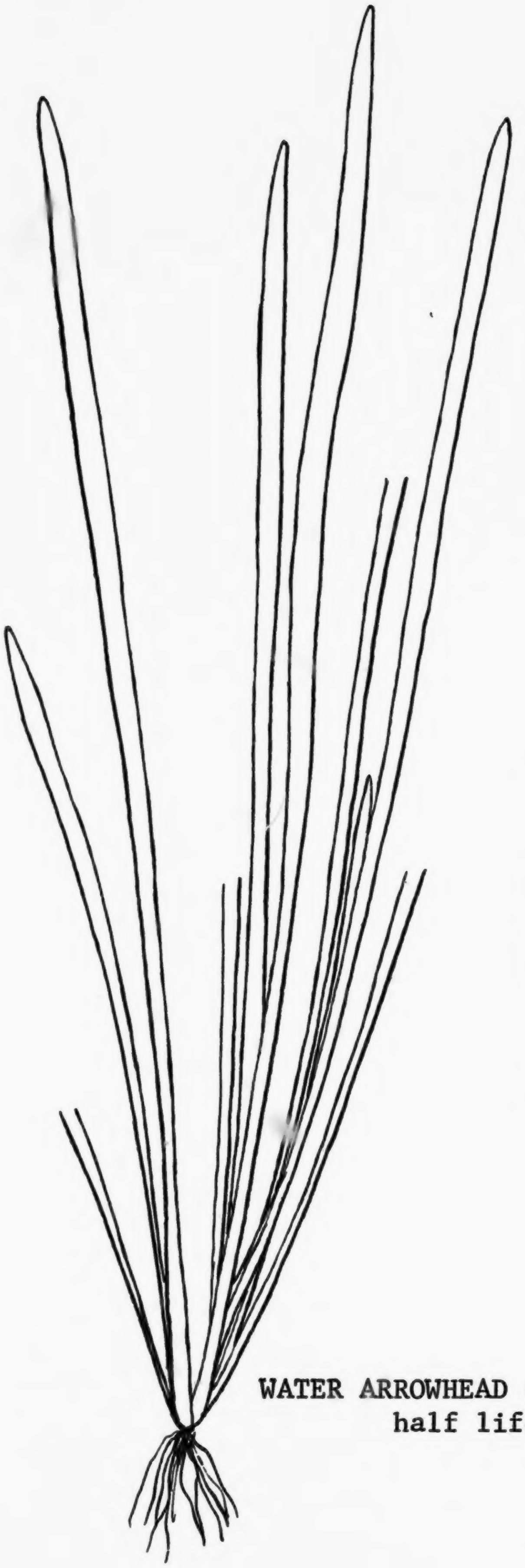
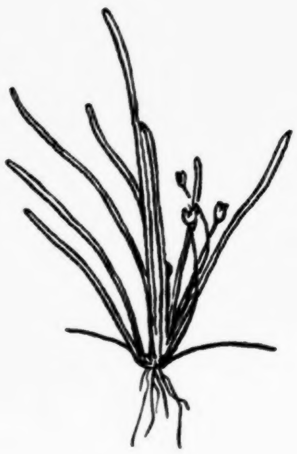


WATER ARROWHEAD (ribbon-leaved),
half life-size



life-size

LIMOSELLA,
Limosella aquatica
(Limosella acaulis and subulata)

Fresh inland water and fresh to brackish coastal water; Northwest Territories to Newfoundland, California, New Mexico, Missouri, and North Carolina (but not inland east of the Mississippi River).

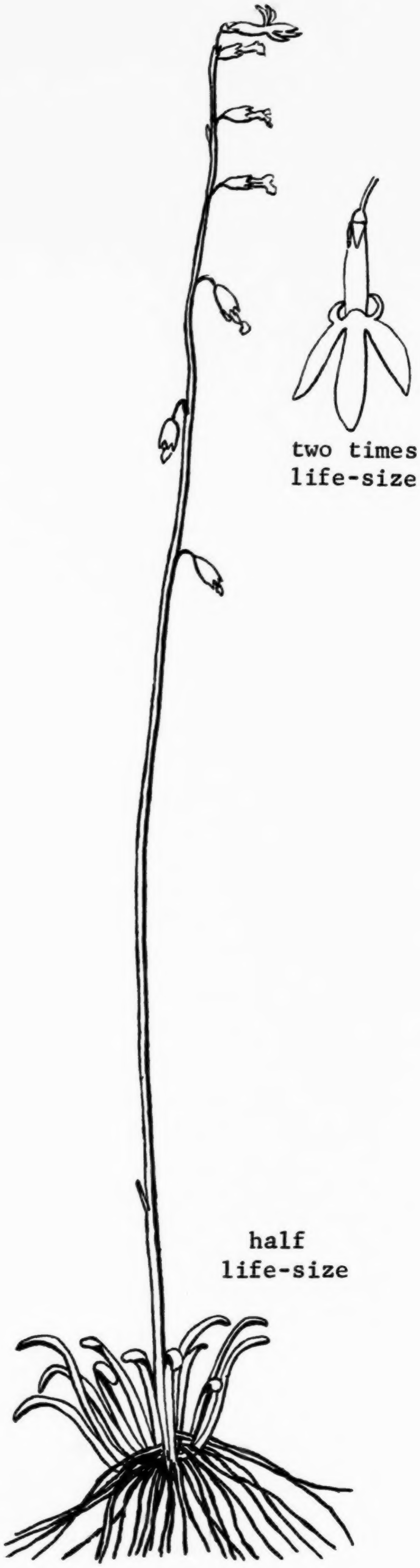
Along the coast, is under water at high tide. Inland, has long-stalked, oval leaves and grows mainly on wet shores.

Resembles small plants of Water Arrowhead (page 20); but Limosella clumps are connected by above-ground runners, and they have tiny, 5-petaled flowers and roundish pods.

WATER LOBELIA,
Lobelia dortmanna

Fresh water; British Columbia to Oregon; and Minnesota to Newfoundland and New Jersey.

Leaves are under water or out of water. Each leaf is composed of two side-by-side tubes. The lavender to white flowers are out of water.



two times
life-size

half
life-size

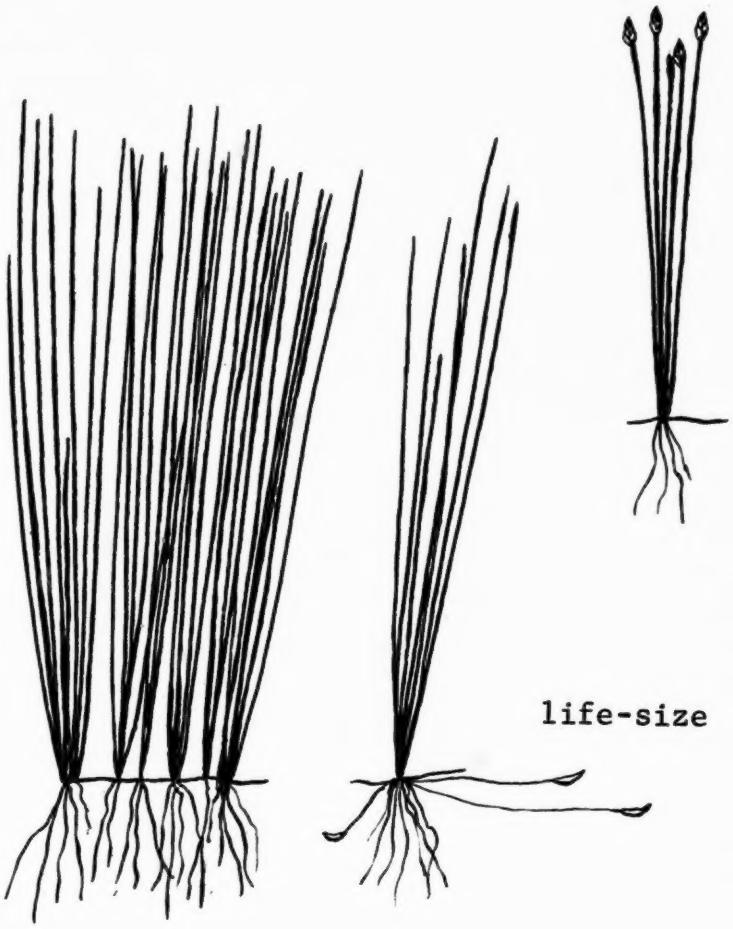
DWARF SPIKERUSH

Eleocharis parvula
(Scirpus nanus, Eleocharis
coloradoensis)

Fresh, brackish, and alkali inland water and fresh to brackish coastal water; British Columbia to Newfoundland, California, and Florida (but very rare inland east of the Mississippi River).

Usually on wet shores and in marshes, growing as a turf of fine green stems which, in summer, are topped with green or brownish flower heads. Often under water in fresh to brackish pools and bays along the coasts, where the stems do not bloom. In summer and fall the rootstocks produce tiny tubers.

Resembles Slender Spikerush (pages 14 and 15); but has thicker stems, produces tubers, and is common in brackish coastal marshes.



life-size

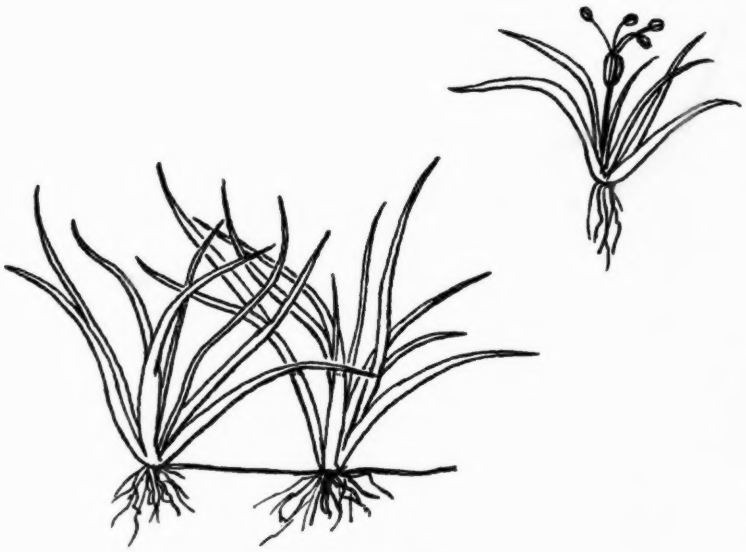
LITTORELLA,

Littorella uniflora
(Littorella americana)

Fresh water; Ontario to Newfoundland, Minnesota, and New York.

Grows in water to several feet deep, or on shore; but blooms only out of water.

Resembles small Quillworts (page 16) and Pipeworts (page 25); but the clumps are connected by rootstocks.



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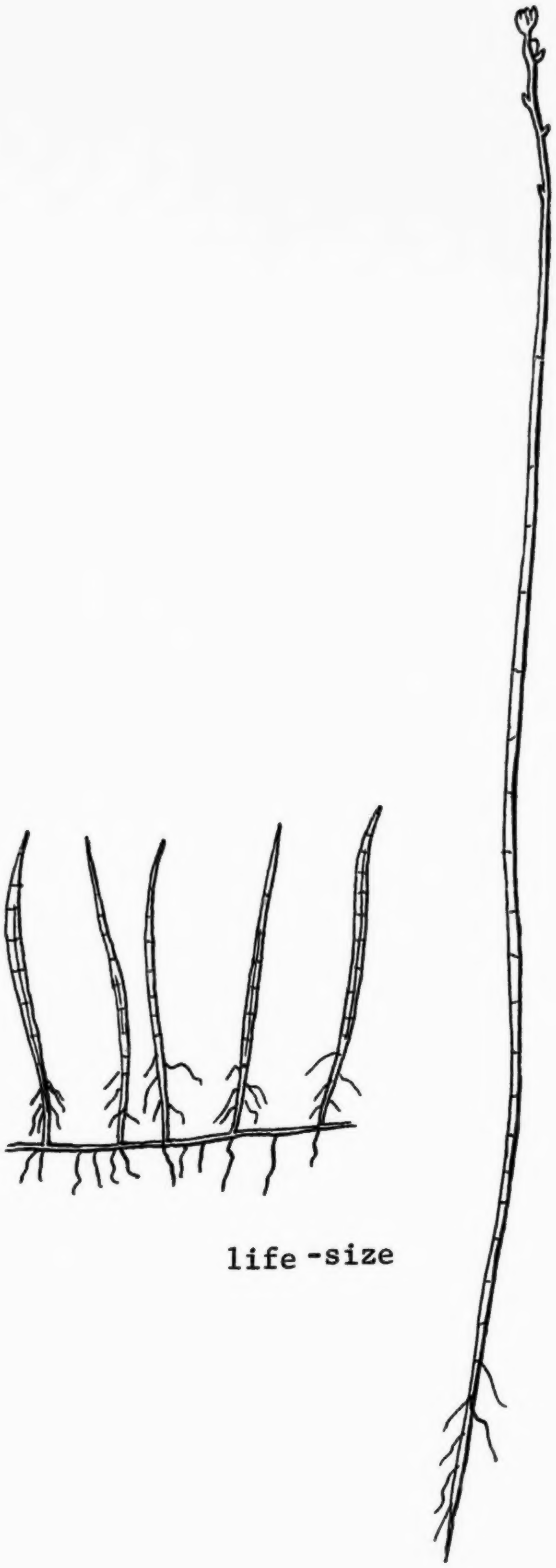


life-size

LEAFLESS WATERMILFOIL,
Myriophyllum tenellum

Fresh water; Minnesota to Newfoundland and Virginia.

Stems have a few, barely visible leaves. Flowers are on stems which stand above water.

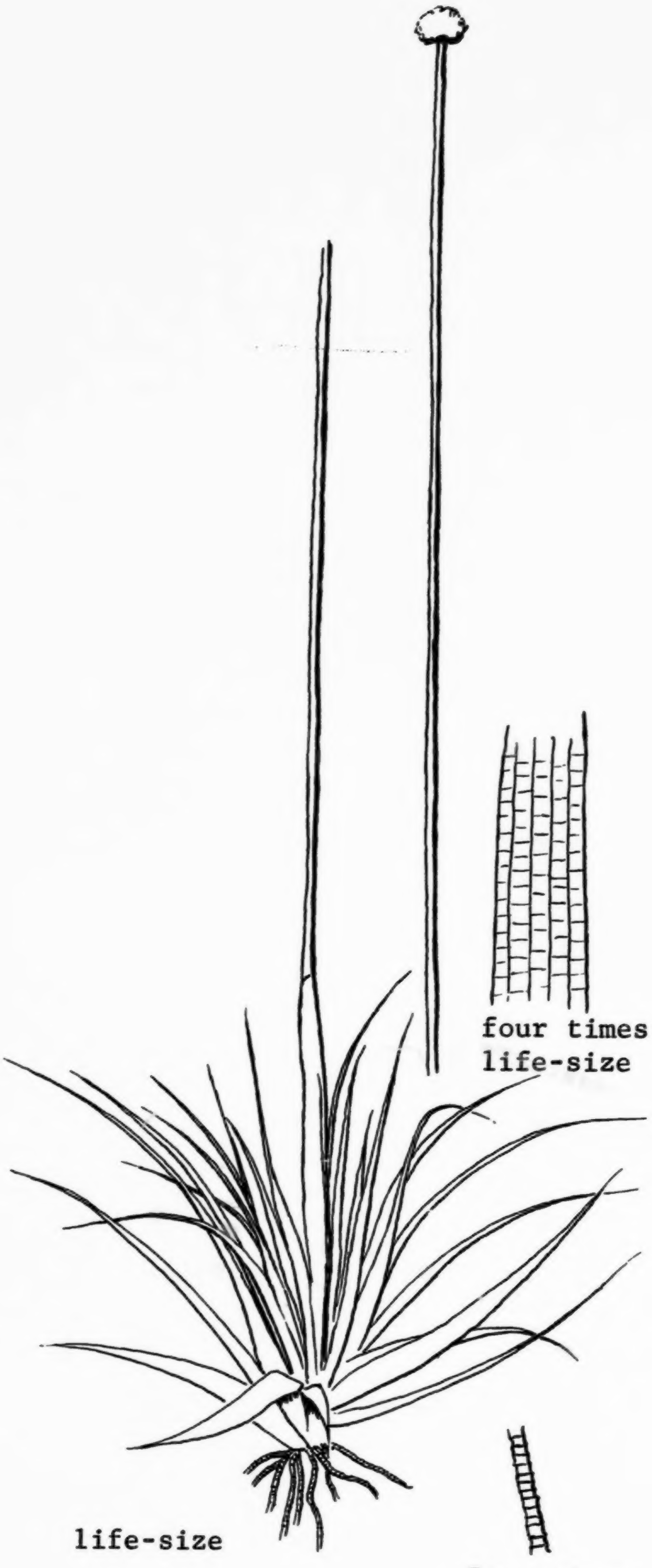
The Watermilfoils with featherlike underwater leaves are described on pages 31-42.

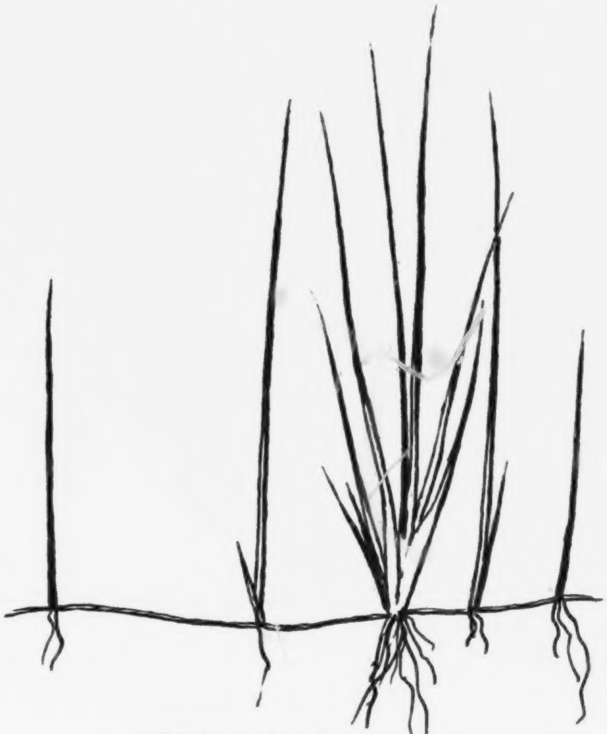
PIPEWORTS, Eriocaulon

There are two kinds of Pipewort which grow with leaves under water and flower heads sticking out, or with the whole plant out of water. Their thin leaves taper from a wide base to a threadlike tip and are checkerboarded with fine veins. Their roots have crosslines which make them look like tiny, whitish angleworms. They are:

EARLY PIPEWORT, Eriocaulon compressum. Fresh water; New Jersey to Texas. Leaves usually larger than those of Northern Pipewort, and heads usually maturing earlier.

NORTHERN PIPEWORT, Eriocaulon septangulare (Eriocaulon lineare and parkeri). Fresh water, inland and coastal; Minnesota to Newfoundland, Alabama, and Florida. Resembles Littorella (page 23), with which it often grows; but clumps of Pipewort leaves are not connected by rootstocks, and Pipewort roots are closely crosslined. Resembles the smaller Quillworts (page 16); but Pipewort leaves taper conspicuously from a wide base, and their roots are closely crosslined.





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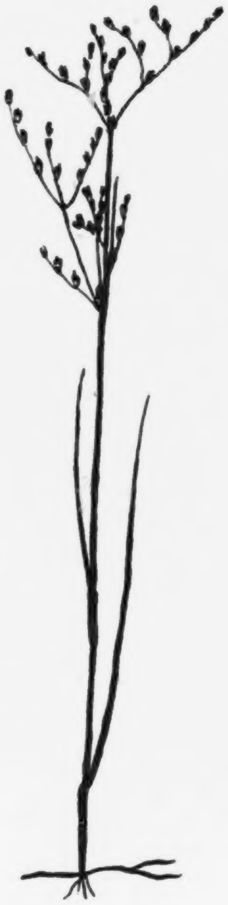

half
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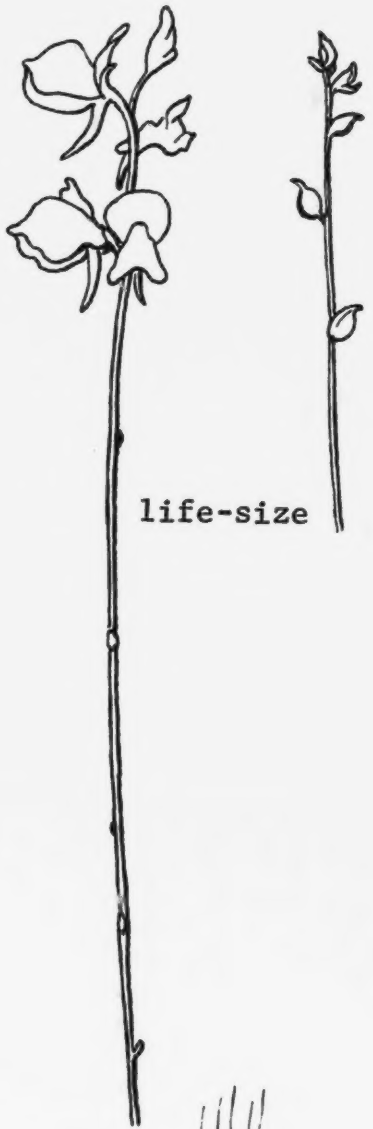
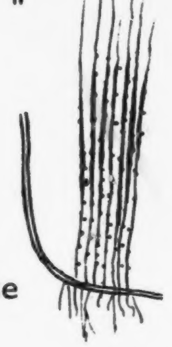


life-size

BOG RUSH, Juncus pelocarpus

Fresh water; Minnesota to Quebec, Indiana, and Maryland.

Underwater plants are not at all like out-of-water plants. They resemble Subularia (page 18); but the clumps of leaves are connected by underground rootstocks, and they do not bloom.



life-size

HORNED BLADDERWORT, Utricularia cornuta
(Utricularia juncea; Stomoisia cornuta, juncea, and virgatula)

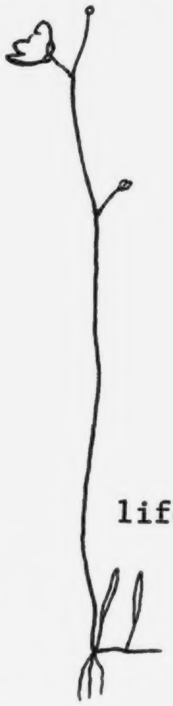
Fresh water; Minnesota to Newfoundland, Texas, and Florida (but not in the Middle Mississippi Valley).

Slim undivided leaves, fringed with speck-sized bladders, are half-buried in soil, either under water or out of water. They are likely to be overlooked until the turf beneath flowers is dug out and the soil carefully washed away. Flowers vary from big, open, and bright yellow to small and permanently budlike.

ZIGZAG BLADDERWORT,
Utricularia subulata
(Setiscapella cleistogama and subulata)

Fresh water; Ontario to Nova Scotia, Texas, and Florida.

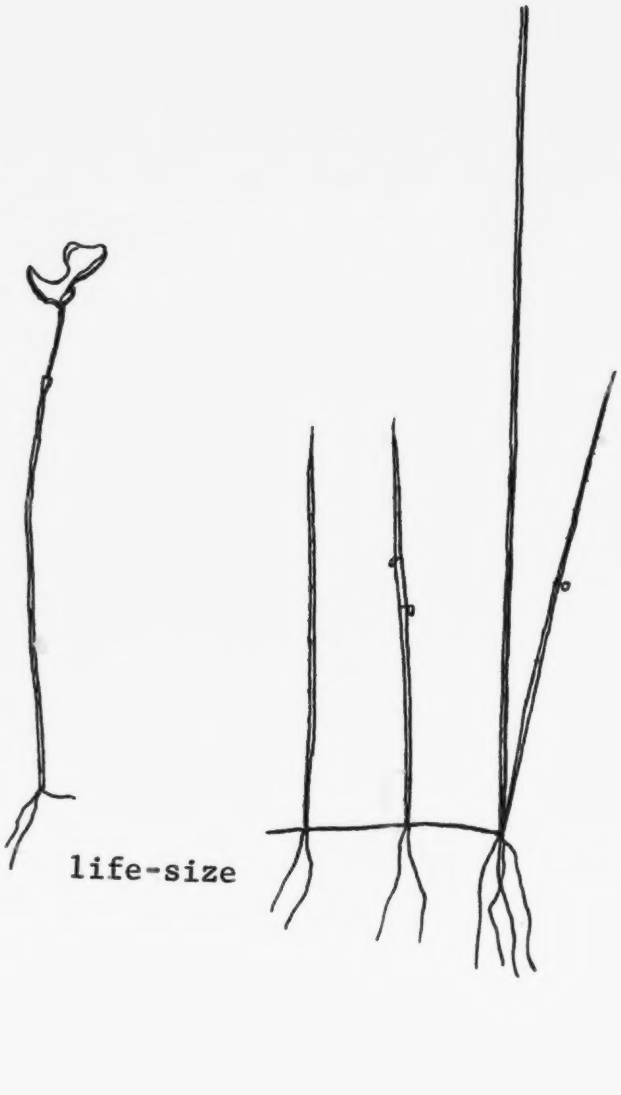
Tiny undivided leaves are half-buried in soil, either under water or out of water. They are likely to be overlooked until the turf beneath flowers is dug out and the soil carefully washed away. Speck-sized bladders are on underground branches. Flowers vary from open and yellow to permanently budlike.


life-size

LAVENDER BLADDERWORT,
Utricularia resupinata
(Lecticula resupinata)

Fresh water; Wisconsin to Nova Scotia, Indiana, and Delaware; and Georgia and Florida.

Slim undivided leaves, fringed with a few speck-sized bladders, are half-buried in soil, either under water or out of water. They are likely to be overlooked until the turf beneath flowers is dug out and the soil carefully washed away. Has one lavender flower to a stem.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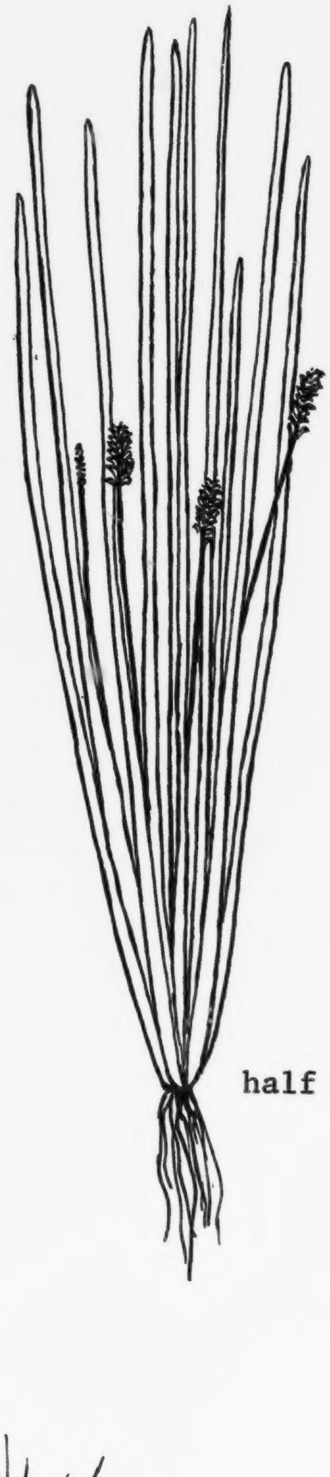


half life-size

FLOWERING-QUILLWORT, Lilaea scilloides

Fresh water; British Columbia to Alberta, California, and Montana (but commonest in central California).

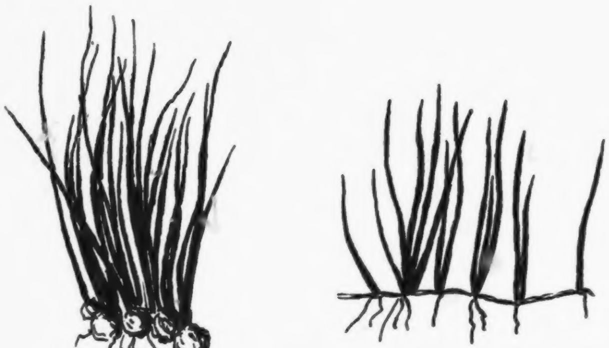
Varies from one-quarter the height pictured to twice as high.

PILLWORT, Pilularia americana

In open-land depressions which contain water in the spring; Oregon and California; and Kansas to Georgia and Texas.

Leaf tips uncoil as they mature. Spores are borne in fuzzy balls at the base of leaves.

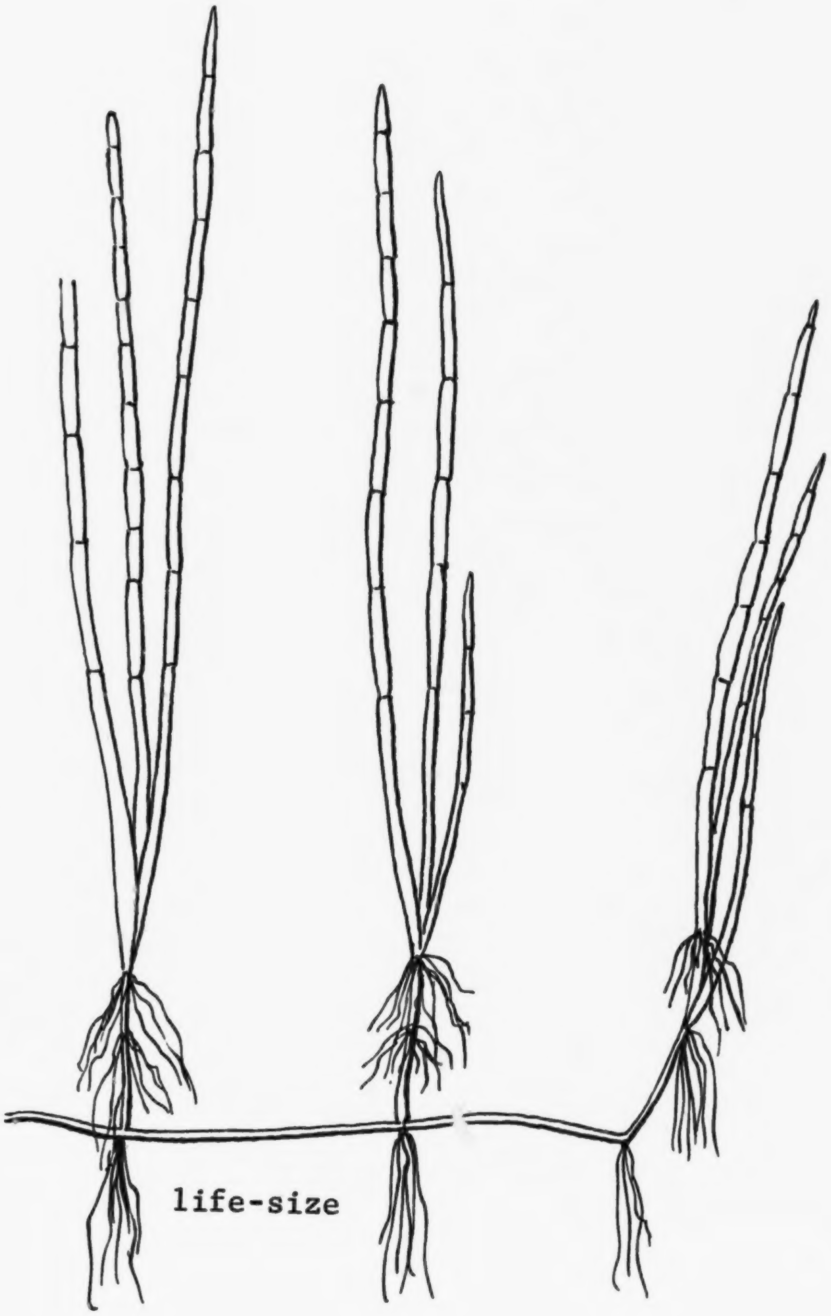
Resembles small Quillworts (page 16); but Pillwort clumps are connected by rootstocks, and Pillwort leaves do not have enlarged bases.

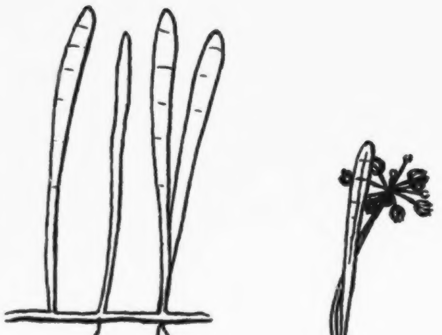


life-size

WESTERN LILAEOPSIS,
Lilaeopsis occidentalis

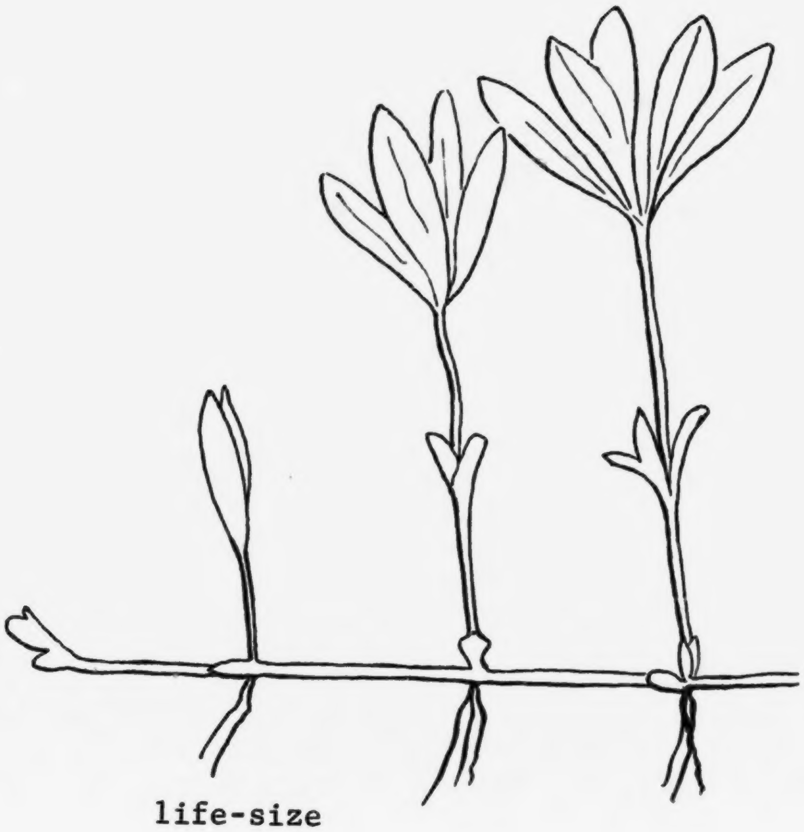
Fresh to brackish coastal water; British Columbia to California.
Under water at high tide, out of water at low. Leaves are hollow and jointed. Flowers are tiny and white.





EASTERN LILAEOPSIS, Lilaeopsis chinensis
(Lilaeopsis lineata)

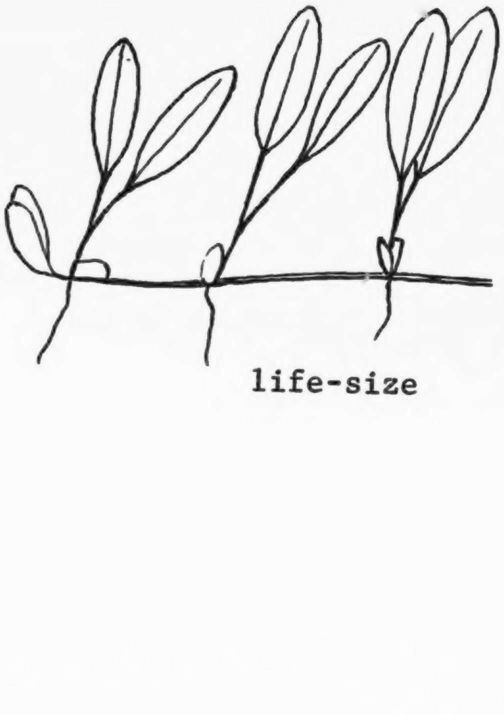
Fresh to brackish coastal water; Nova Scotia to Louisiana.
Under water at high tide, out of water at low. Leaves are hollow and jointed. Flowers are tiny and white.



life-size

GULF HALOPHILA,
Halophila engelmanni

Salt water; Florida and Texas. Firm leaves are stalkless or short-stalked and have a faint midvein.

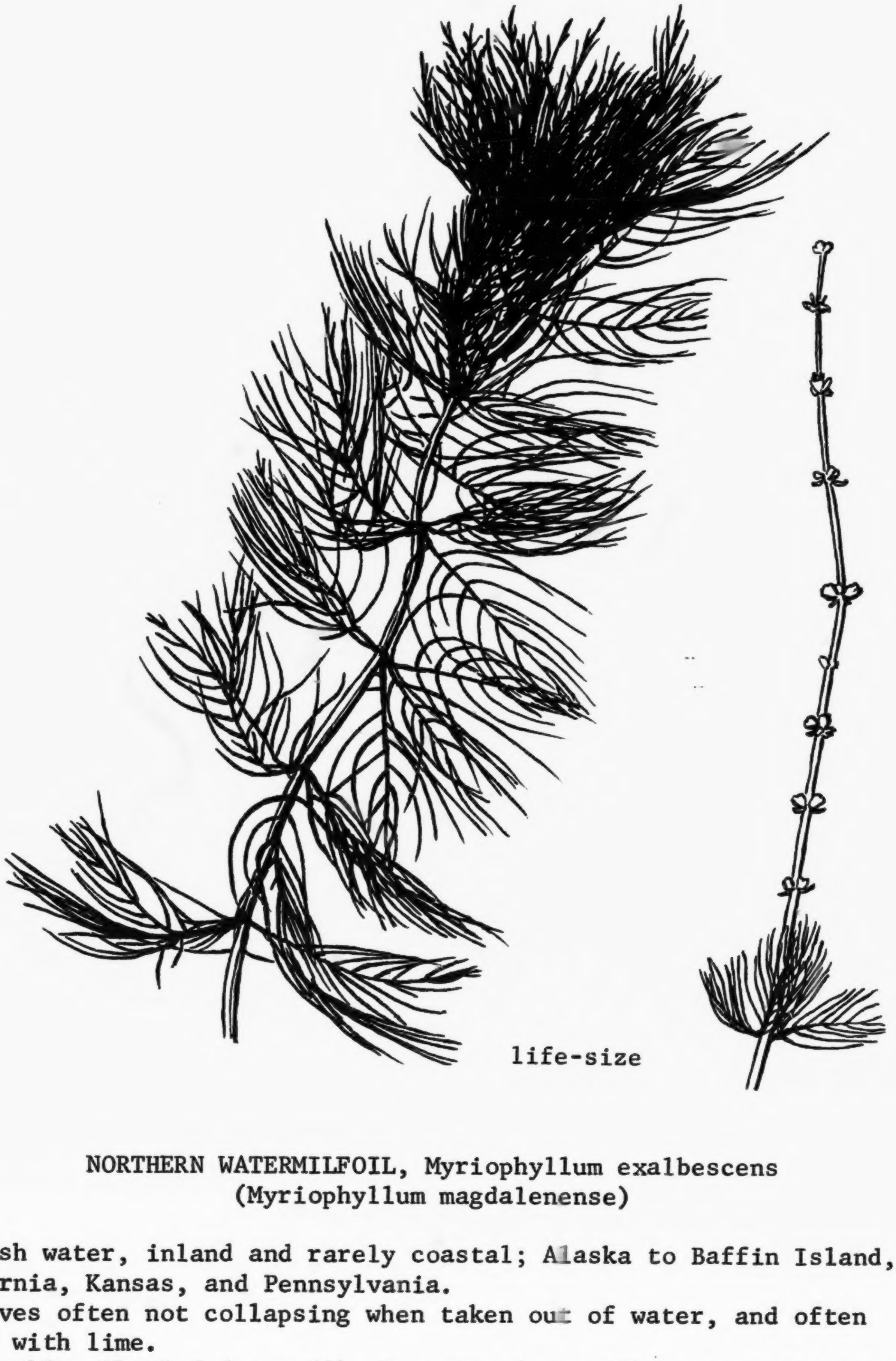


life-size

CARIBBEAN HALOPHILA,
Halophila baillonis

Salt water; Florida. Limp leaves are long-stalked and have a conspicuous midvein.

Group 3. PLANTS WITH FEATHERLIKE, USUALLY LIMP LEAVES ON FLEXIBLE UNDERWATER STEMS; STEM TIPS OFTEN STICKING OUT OF WATER grow in fresh inland water and in fresh to brackish coastal water. The stems vary from upright to horizontal and from a foot long to several feet; and they are usually branched. The underwater leaves usually collapse when taken out of water. At low tide, Eurasian Watermilfoil reaches the surface in a tangle of horizontal stems. When water levels drop in summer, several other kinds make a similar tangle; and a few produce short out-of-water stems. Most Watermilfoils are hard to tell apart when they don't have flowers or seeds. When in bloom, most of them have tiny brownish flowers in spikes which stand above the water. When the seeds are ripe, the spikes are usually lying in water. The seeds are partly joined to each other in fours. The largest kinds are only a little more than 1/16 inch long.

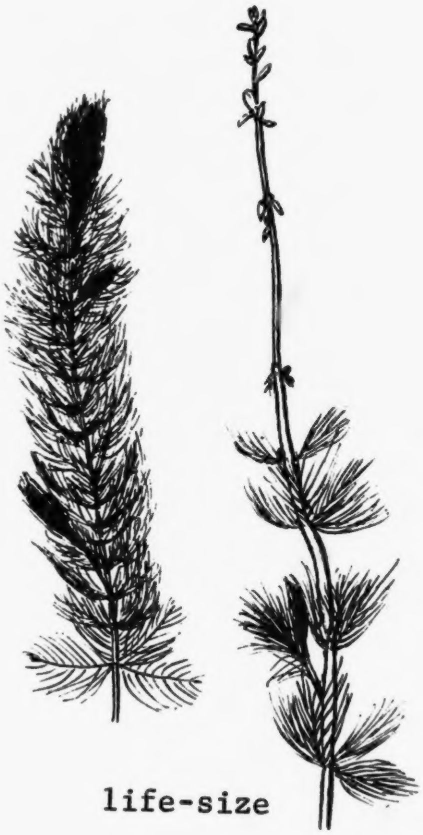


NORTHERN WATERMILFOIL, Myriophyllum exalbescens
(Myriophyllum magdalenense)

Fresh water, inland and rarely coastal; Alaska to Baffin Island, California, Kansas, and Pennsylvania.

Leaves often not collapsing when taken out of water, and often coated with lime.

Resembles Whorled (page 34), Eurasian (page 38), and Little (page 33) Watermilfoils, with which it sometimes grows. Its joints are farther apart than those of Whorled; therefore the usually buff or pinkish stems are not hidden by leaves. Its leaves have fewer, wider-spaced leaflets than those of Eurasian. Its stems and leaves are usually twice as large as those of Little.



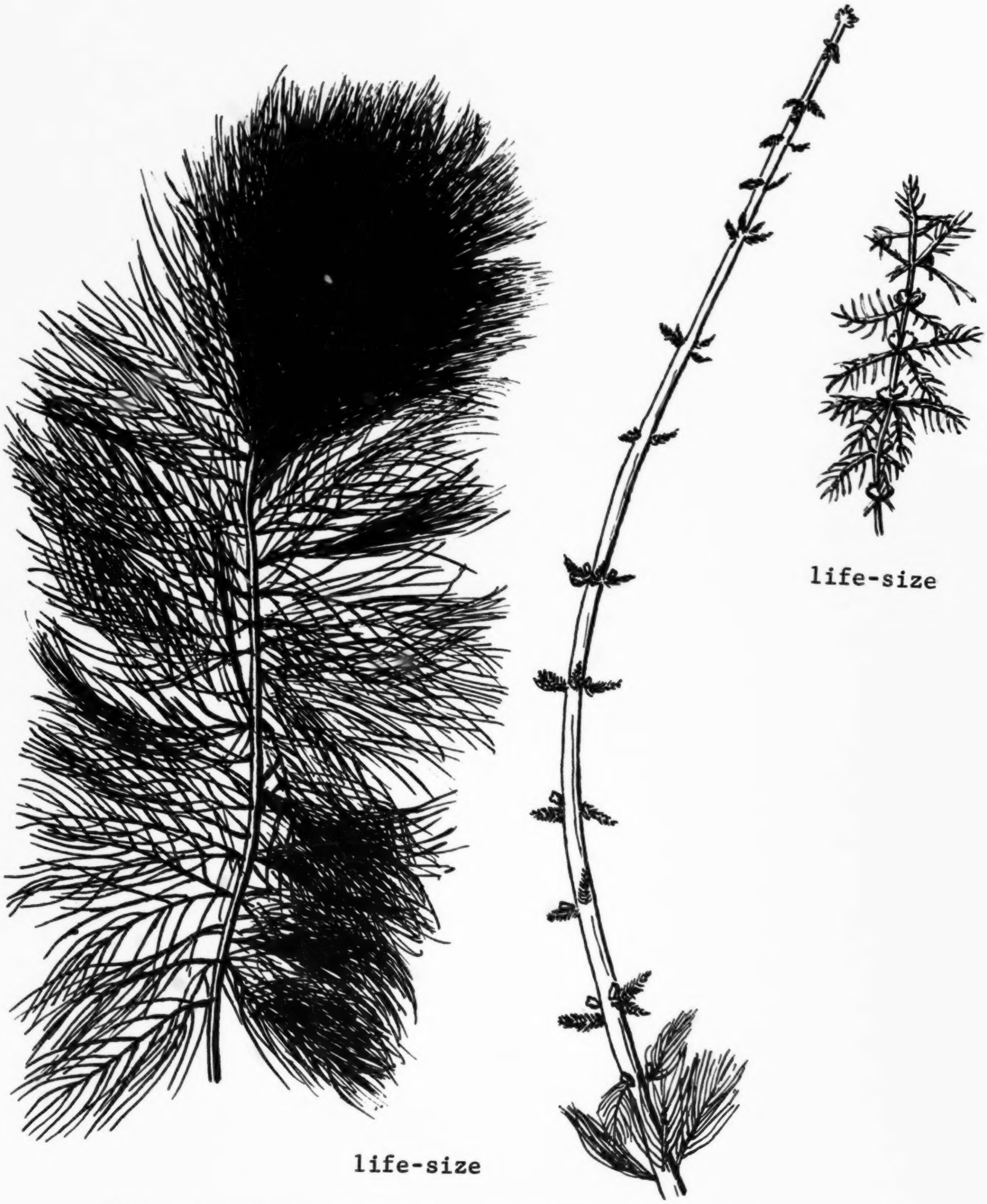
life-size

LITTLE WATERMILFOIL, Myriophyllum alterniflorum

Fresh water, inland and rarely coastal; Alaska to Newfoundland, Wisconsin, and Connecticut.

The leaves are so small and close together that a person has to look closely to be sure they are featherlike.

Resembles Northern (page 32) and Whorled (page 34) Watermilfoils; but stems and leaves are usually no more than half the size of theirs, and upper flowers are scattered instead of in whorls.



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WHORLED WATERMILFOIL, Myriophyllum verticillatum

Fresh water, inland and rarely coastal; Alaska to Newfoundland, California, Illinois, and New Jersey.

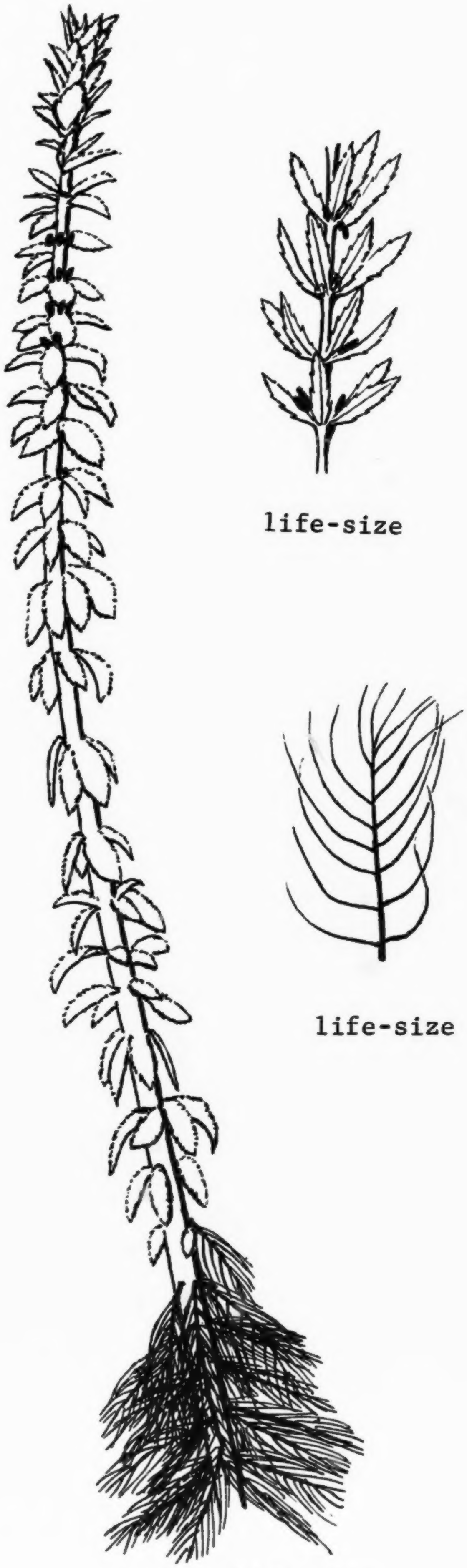
Stems usually green and almost hidden by leaves. During low water in summer, patches of short out-of-water stems sometimes grow on mud.

Resembles Northern (page 32), Eurasian (page 38), Little (page 33), and Farwell (page 36) Watermilfoils, with which it sometimes grows. Its joints are closer together than those of Northern; therefore its usually green stems are nearly hidden by leaves. Its leaves have fewer leaflets than those of Eurasian. Its stems and leaves are usually twice as large as those of Little. Its out-of-water flowers contrast with Farwell's underwater ones.

VARIABLE WATERMILFOIL,
Myriophyllum heterophyllum
(Myriophyllum hippuroides)

Fresh water; British Columbia to New Brunswick, California, and Florida.

Stems, stouter than in most other Watermilfoils, are thickly covered with limp leaves. Spikes, also stouter than in most of the others, are usually thickly covered with firm, oval to linear leaves.



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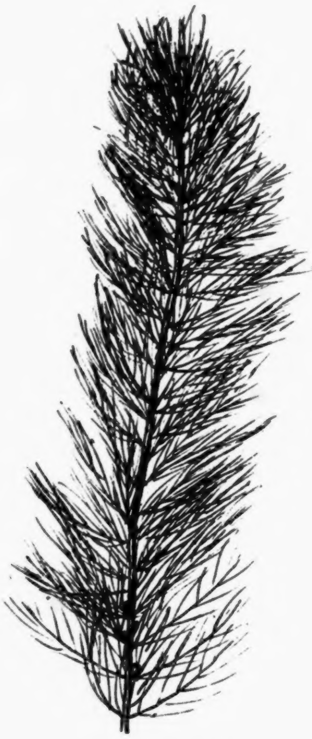
FARWELL WATERMILFOIL,
Myriophyllum farwellii

Fresh water; Minnesota to Nova Scotia and Vermont.

Flowers all at the base of underwater leaves, not in out-of-water spikes.

Resembles Whorled Watermilfoil (page 34), with which it sometimes grows; but Farwell's flowers are at the base of underwater leaves.



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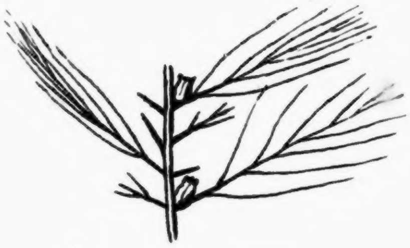
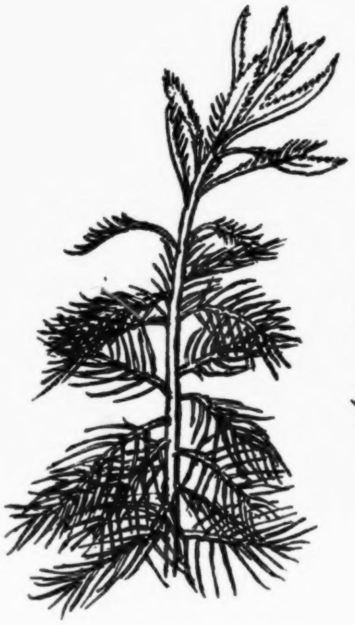


two times life-size

MARSH MERMAIDWEED,
Proserpinaca palustris
(Proserpinaca amblyogona and platycarpa)

Fresh water; Wisconsin to Nova Scotia, Texas, and Florida.

From fall to early spring, stems of the preceding year send out underwater stems with foliage resembling that of Northern Watermilfoil (page 32), except that there is only one leaf at a joint. By mid-spring, stem tips with toothed leaves reach out of water. In summer, the whole plant is often out of water and there is a three-cornered seed at the base of many of the leaves.



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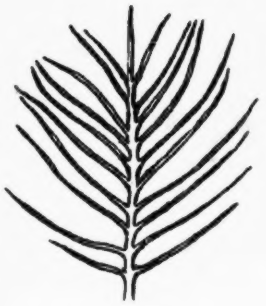

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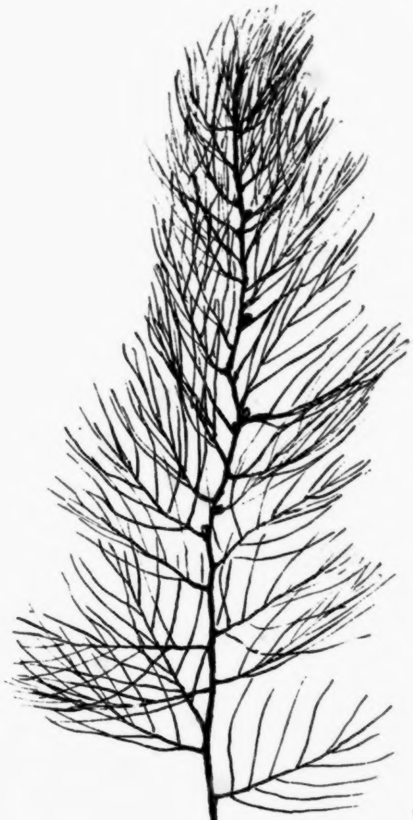

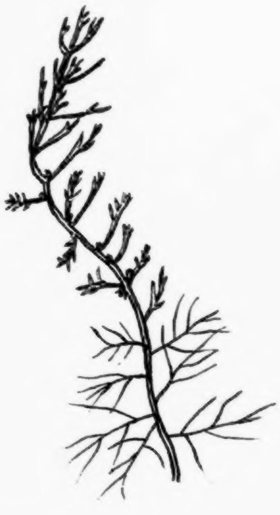

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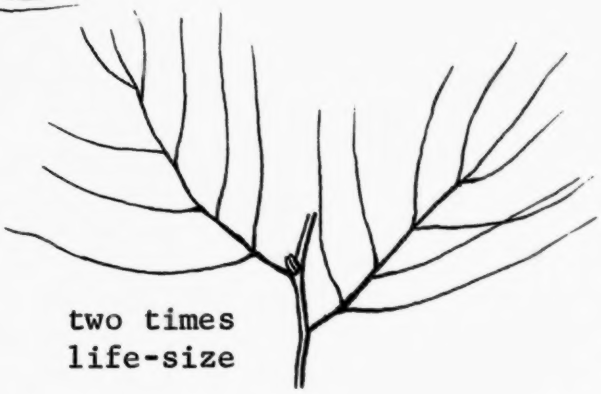

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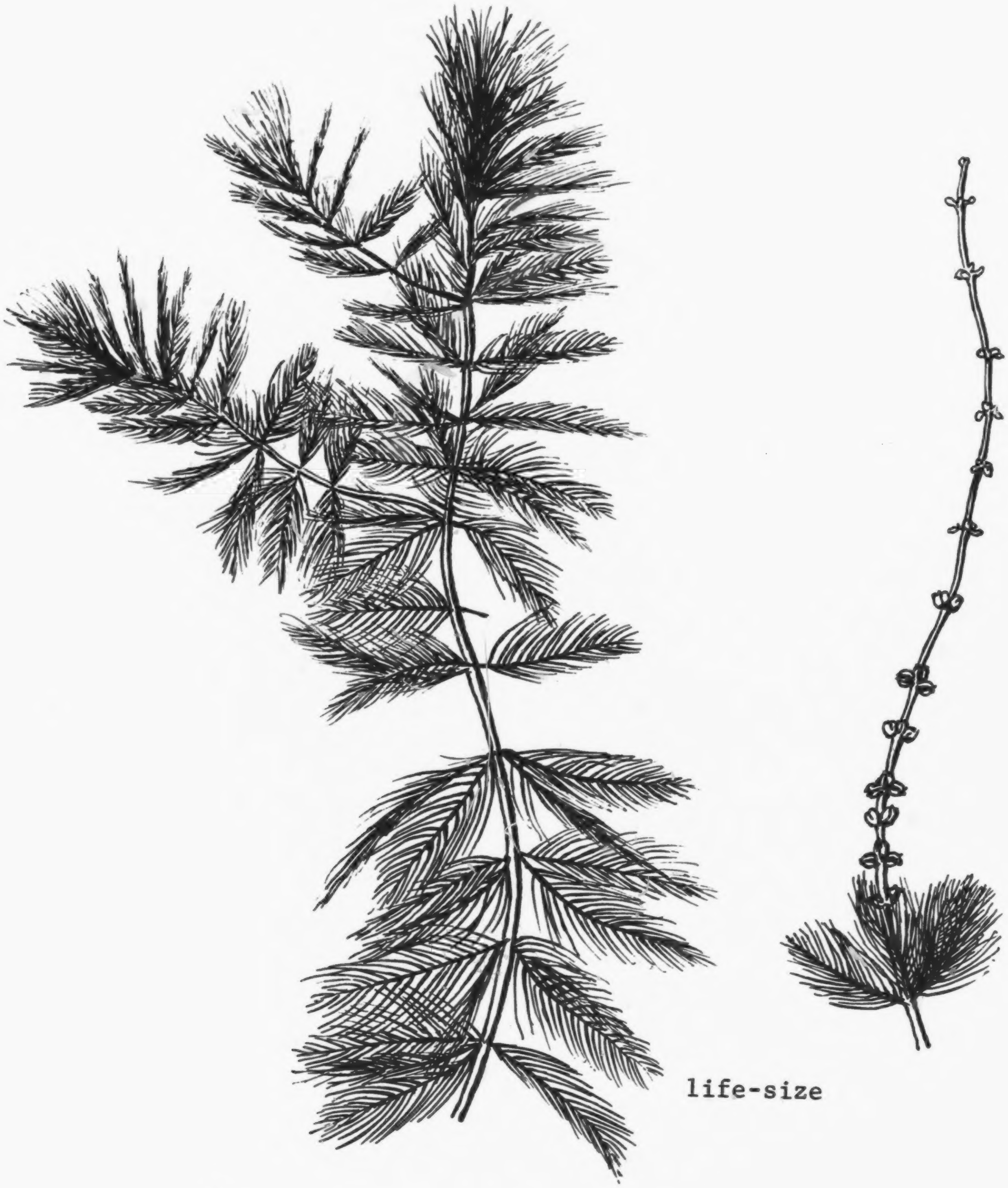
LOW WATERMILFOIL, Myriophyllum humile

Fresh water, inland and rarely coastal; Nova Scotia to North Carolina.

Stems thinly covered with very fine, limp leaves; their tip sometimes out of water and bearing small, firm, slightly-divided or undivided leaves. Usually there is only one out-of-water leaf at a joint. Flowers are at the base of either underwater leaves or out-of-water leaves. During low water in summer, patches of short out-of-water stems sometimes grow on mud.

Foliage on underwater stems resembles that of Eastern Watermilfoil (page 40), with which it sometimes grows; but Low Watermilfoil has smooth-backed seeds which are 1/32 inch long or a little more--so tiny that they are easily overlooked.



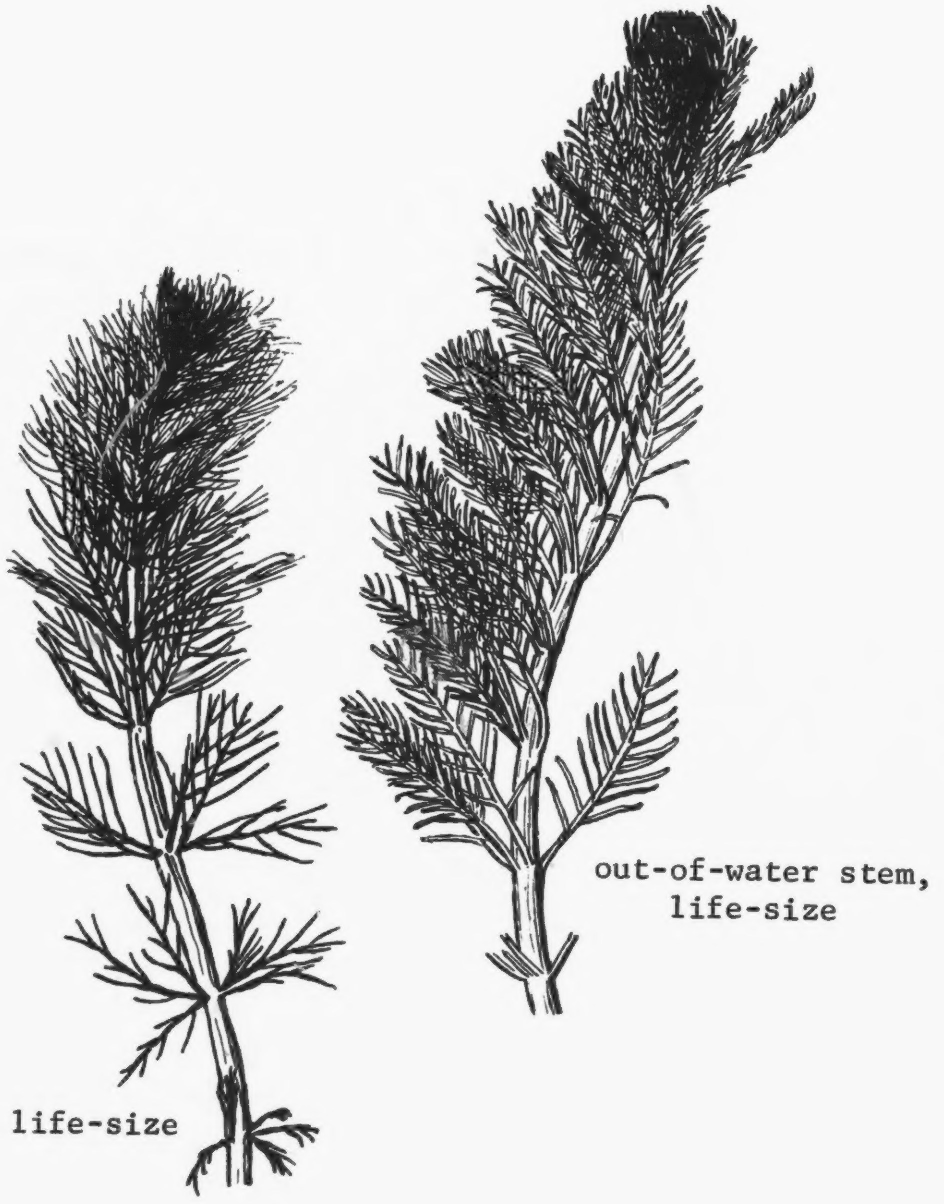
EURASIAN WATERMILFOIL, Myriophyllum spicatum

Fresh inland water and fresh to brackish coastal water; California; and Wisconsin to Vermont, Texas, and Florida.

This plant has been in the United States for at least seventy years. Since 1955 it has become very abundant in Upper Chesapeake Bay, the tidal Potomac River, and several Tennessee Valley reservoirs.

Leaves look like weatherbeaten feathers because of their 12-16 pairs of close-together leaflets.

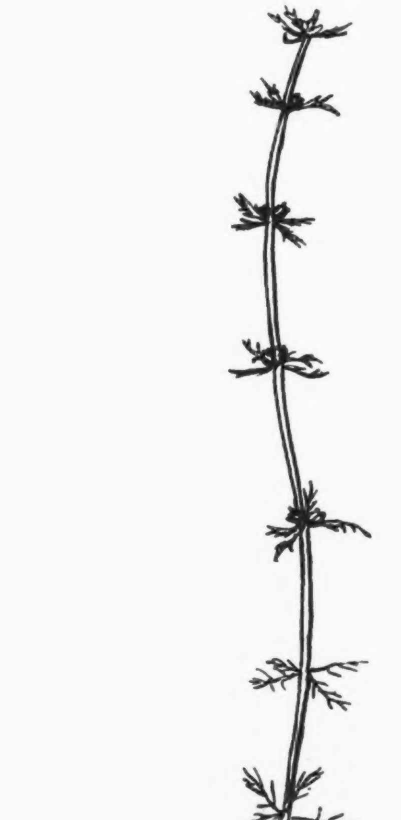
Resembles Northern (page 32) and Whorled (page 34) Watermilfoils, with which it sometimes grows; but can be told from them by its more featherlike leaves.



PARROTFEATHER, Myriophyllum brasiliense
(Myriophyllum proserpinacoides)

A native of South America which is a common aquarium plant and which has run wild in fresh water from Idaho to California and Arizona; and Kansas to New York, Texas, and Florida.

Differs from other Watermilfoils in having firm, grayish-green foliage which pushes a few inches out of water. Has some underwater branches with limp leaves.



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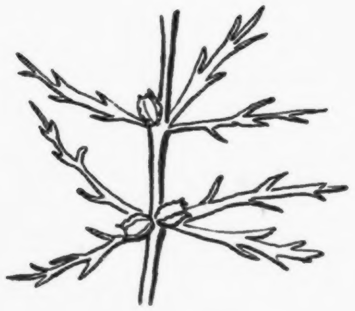

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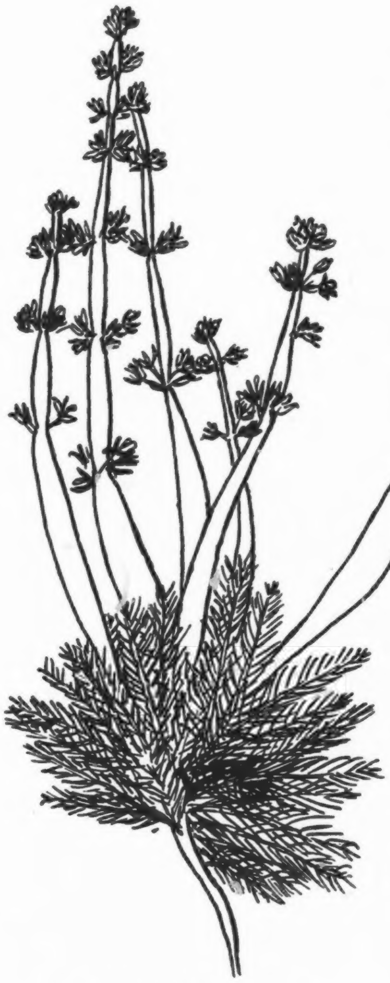
EASTERN WATERMILFOIL,
Myriophyllum pinnatum

Fresh water, inland and coastal; Iowa to Massachusetts, Texas, and Florida.

Stems thinly covered with very fine, limp leaves; their tip often out of water and bearing small, firm, slightly-divided leaves. Out-of-water leaves usually clustered at joints and with a flower at their base. During low water in summer, patches of short out-of-water stems sometimes grow on mud.

Foliage on underwater stems resembles that of Low Watermilfoil (page 37), with which it sometimes grows; but Eastern has rough-backed seeds which are 1/16 inch long.



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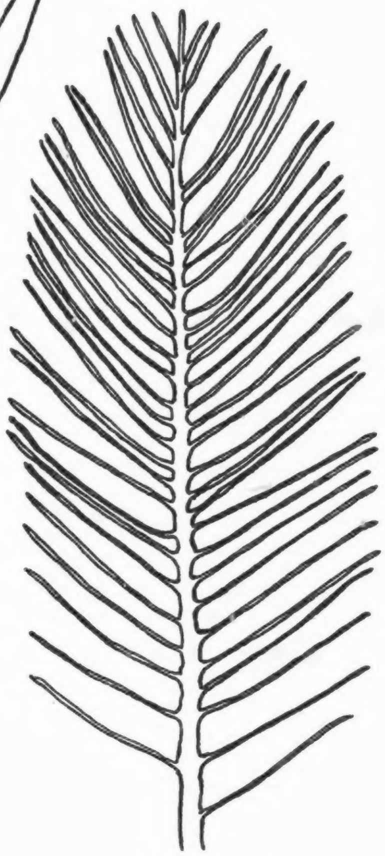

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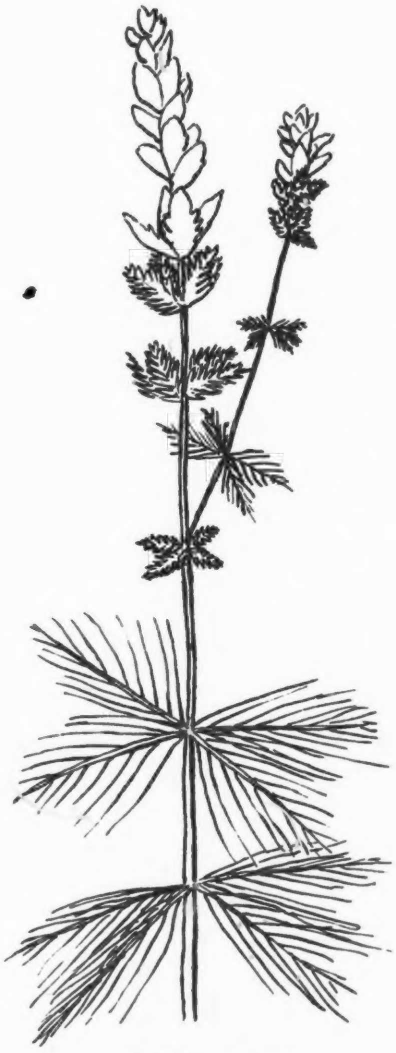
FEATHERFOIL, Hottonia inflata

Usually in pools in freshwater swamps; Missouri to Maine, Texas, and Florida.

Comes up from seed in the fall; and from fall to spring the leaves are bunched toward the tip of unbranched stems, just below the surface of the water. Usually is overlooked until clusters of swollen flower stalks grow above water in spring and early summer.



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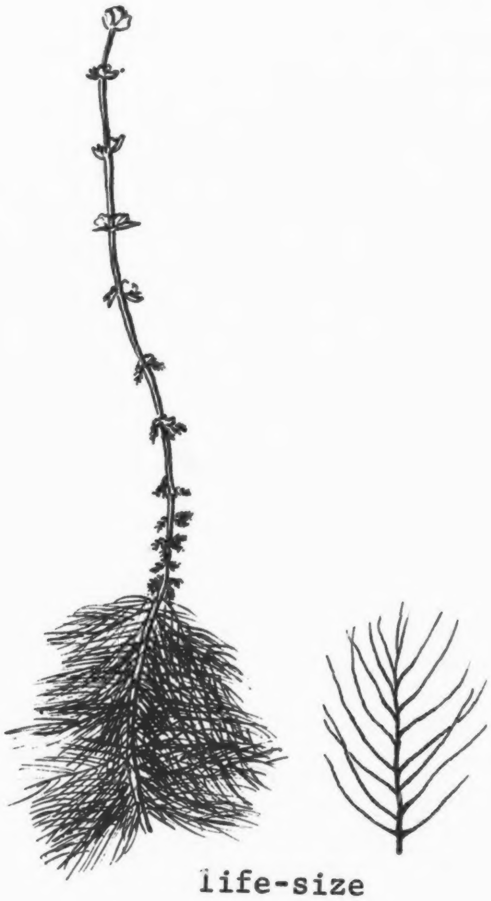
ANDEAN WATERMILFOIL,
Myriophyllum elatinoides

A native of South America and New Zealand which has run wild in the Deschutes River near Bend, Oregon.

Out-of-water leaves grayish-green. Midvein of underwater leaves tapering from base to tip.



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SOUTHERN WATERMILFOIL,
Myriophyllum laxum

Fresh water; North Carolina to Alabama.

Resembles Whorled Watermilfoil (page 34) which has not been found south of New Jersey. Resembles Variable Watermilfoil (page 35); but has slimmer stems and nearly leafless spikes.

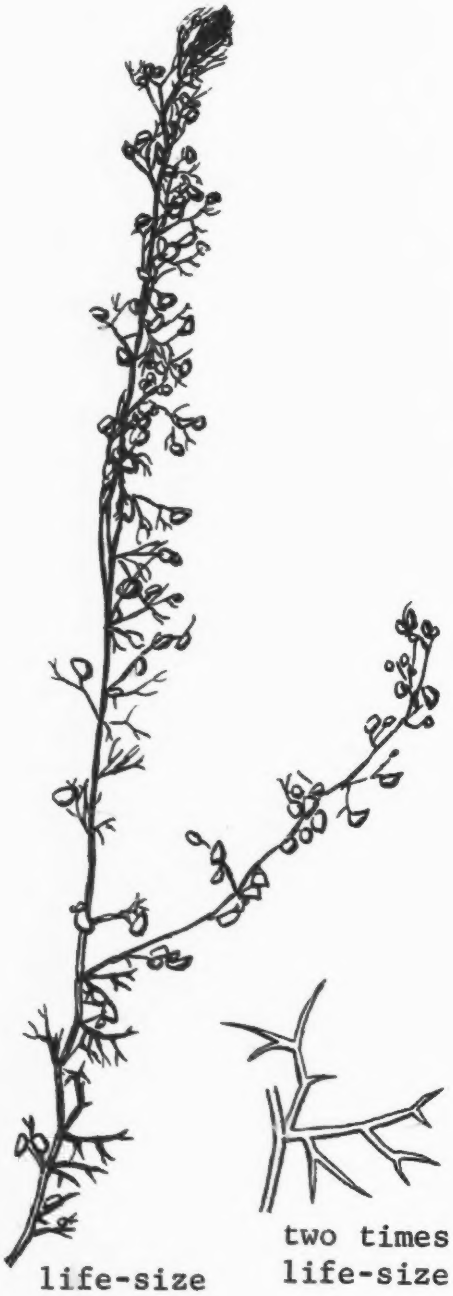
Group 4. PLANTS WITH FINE-FORKED, LIMP LEAVES MIXED WITH SMALL ROUNDISH BLADDERS ON FLEXIBLE UNDERWATER STEMS; FLOWERS STICKING OUT OF WATER are most abundant in brownish, shallow, fresh water over bottoms mushy with decaying vegetation. The stems grow horizontally or slantwise; vary from an inch long in Dwarf Bladderwort to twenty feet in Giant Bladderwort; and are usually branched. The leaves collapse when taken out of water. Some kinds are hard to tell apart when they don't have flowers. When in bloom, their yellow, purplish, or whitish flowers are on out-of-water stalks.

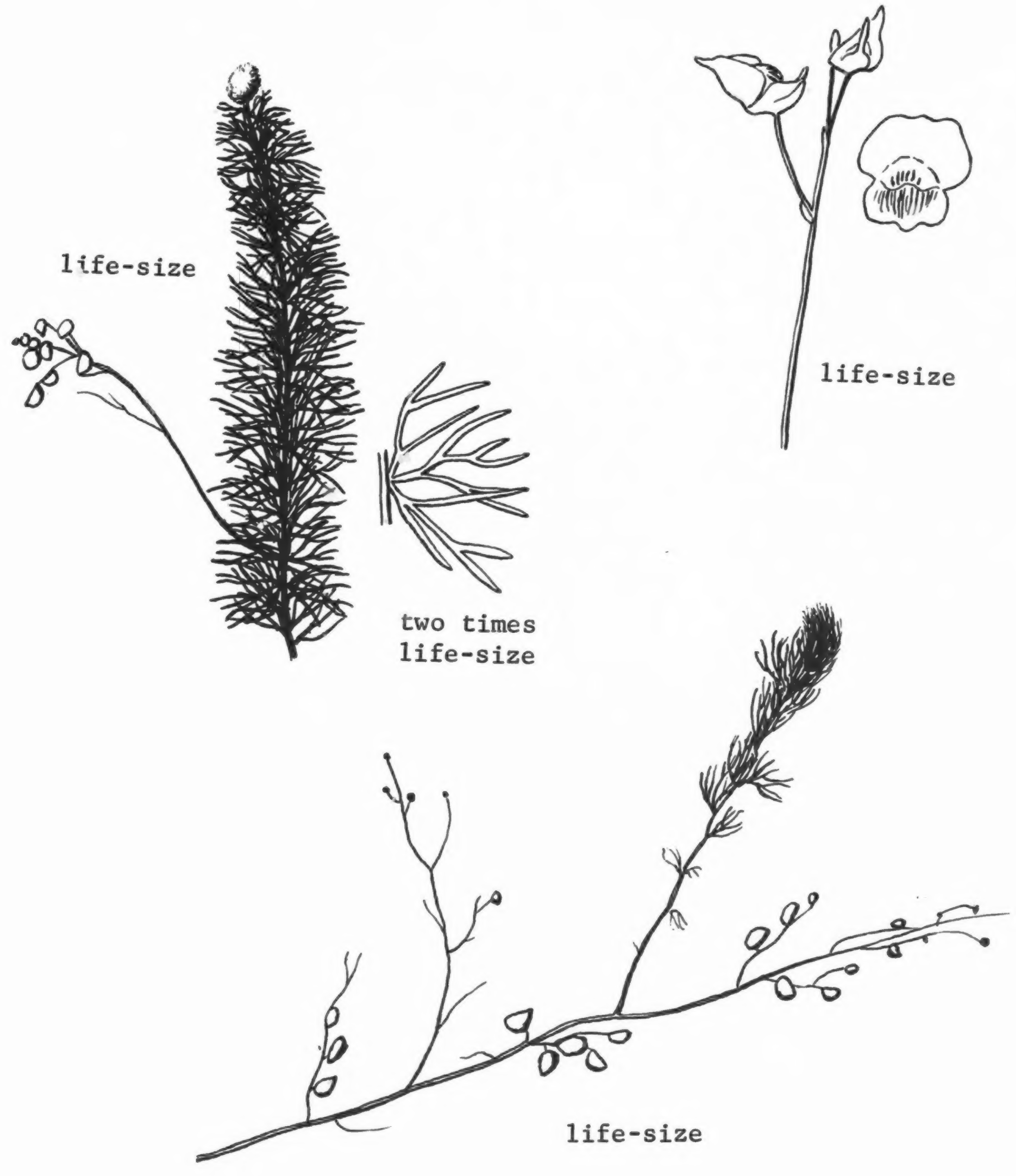
Bladderworts which do not have forked underwater leaves are described on pages 26 and 27.

NORTHERN BLADDERWORT,
Utricularia minor

Fresh water; Alaska to Greenland, California, Colorado, and Pennsylvania.

Bladders and green leaves are mixed together. The leaves fork into flattish, very-sharp-tipped leaflets. Flowers are yellow.

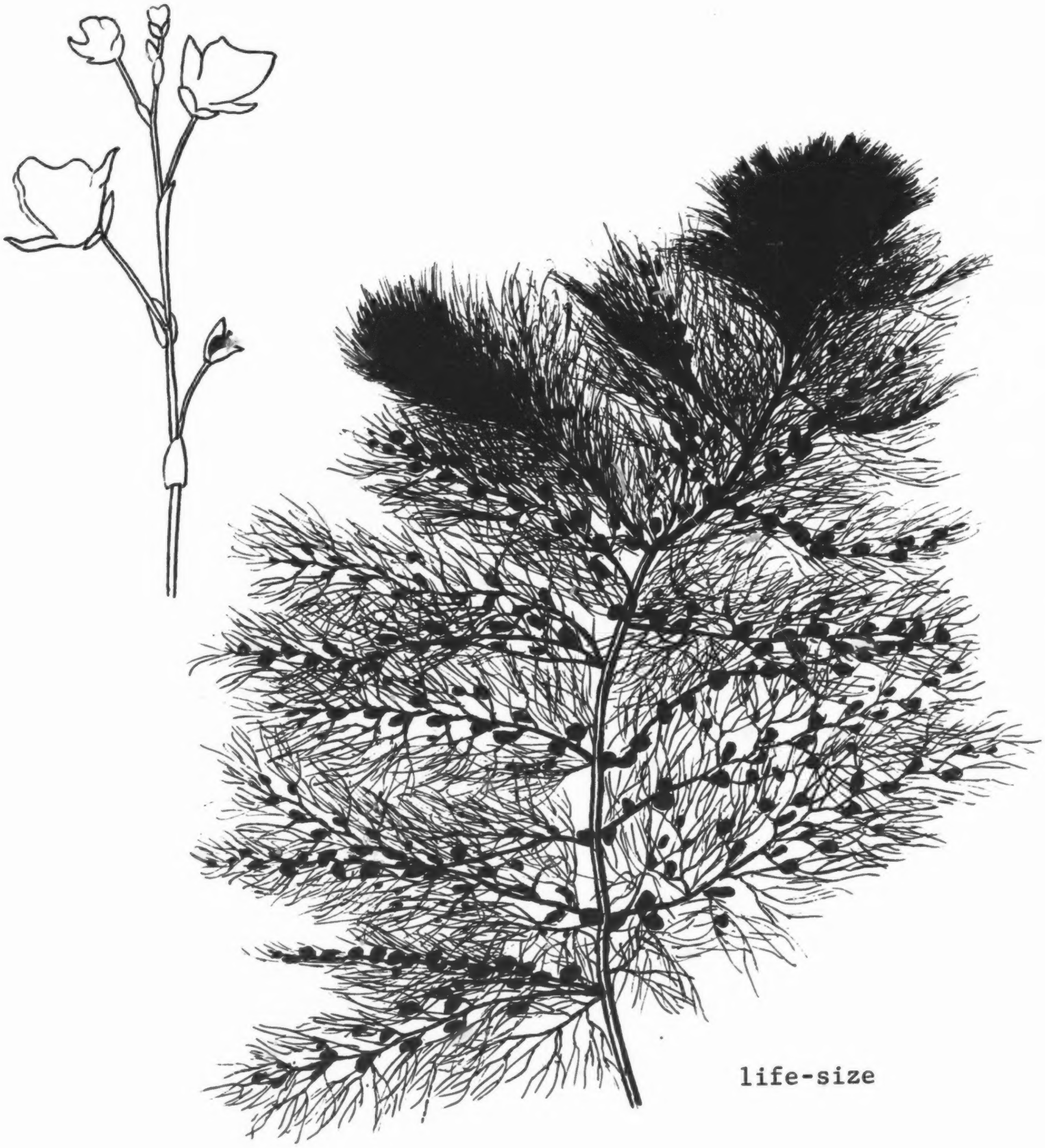



life-size
two times
life-size
life-size
life-size

FLATLEAF BLADDERWORT, Utricularia intermedia
(Utricularia ochroleuca)

Fresh water; Alaska to Greenland, California, and New Jersey.

Has two kinds of branches. One is thickly covered with green leaves which fork into flattish, usually blunt-tipped leaflets. The other has scattered, colorless to blackish bladders. Flowers are yellow.



COMMON BLADDERWORT, Utricularia vulgaris
(Utricularia macrorhiza)

Fresh water; Alaska to Newfoundland, California, Arkansas, and North Carolina.

Flowers are yellow.

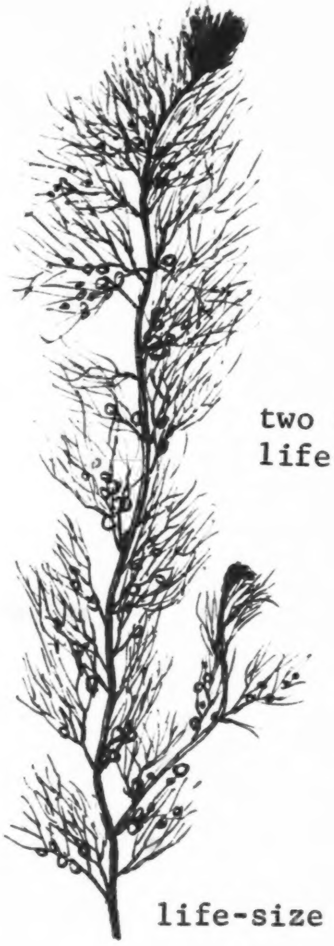
Foliage resembles that of Hidden-flower (page 46), Little Floating (page 48), and Big Floating (page 49) Bladderworts. The leaves are usually much larger and more forked than those of Hidden-flower, and they have larger bladders. The leaves have less zigzag forking and larger bladders than Little Floating. The leaves have less zigzag forking than Big Floating.

HIDDEN-FLOWER BLADDERWORT,
Utricularia geminiscapa

Fresh water; Wisconsin to Newfoundland and Virginia.

Here and there along a main stem are globular pods about the size of a bladder, on a stalk no more than 1/2 inch long. These develop from petal-less flowers.

Resembles small plants of Common Bladderwort (page 45); but Hidden-flower's leaves are usually less-forked, its bladders are usually smaller, and its petal-bearing flowers are much smaller.



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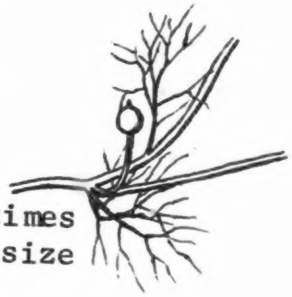

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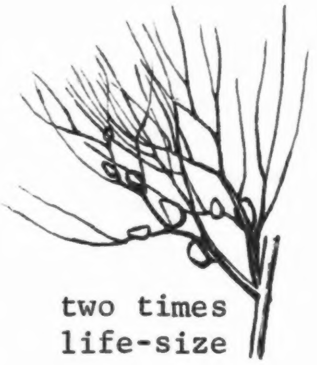

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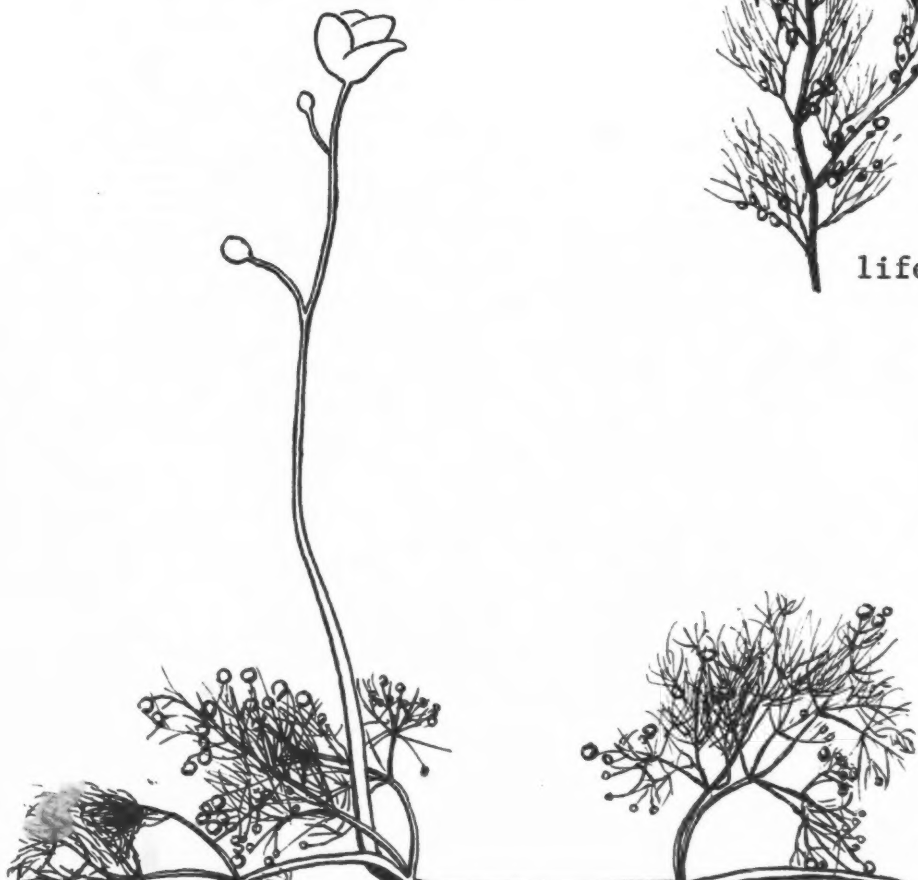
life-size

PURPLE BLADDERWORT,
Utricularia purpurea
(Vesiculina purpurea)

Fresh water; Wisconsin to Nova Scotia, Texas, and Florida (but not in the Middle Mississippi Valley).

The only Bladderwort with a cluster of branches at each joint of its stems. Flowers are purplish.



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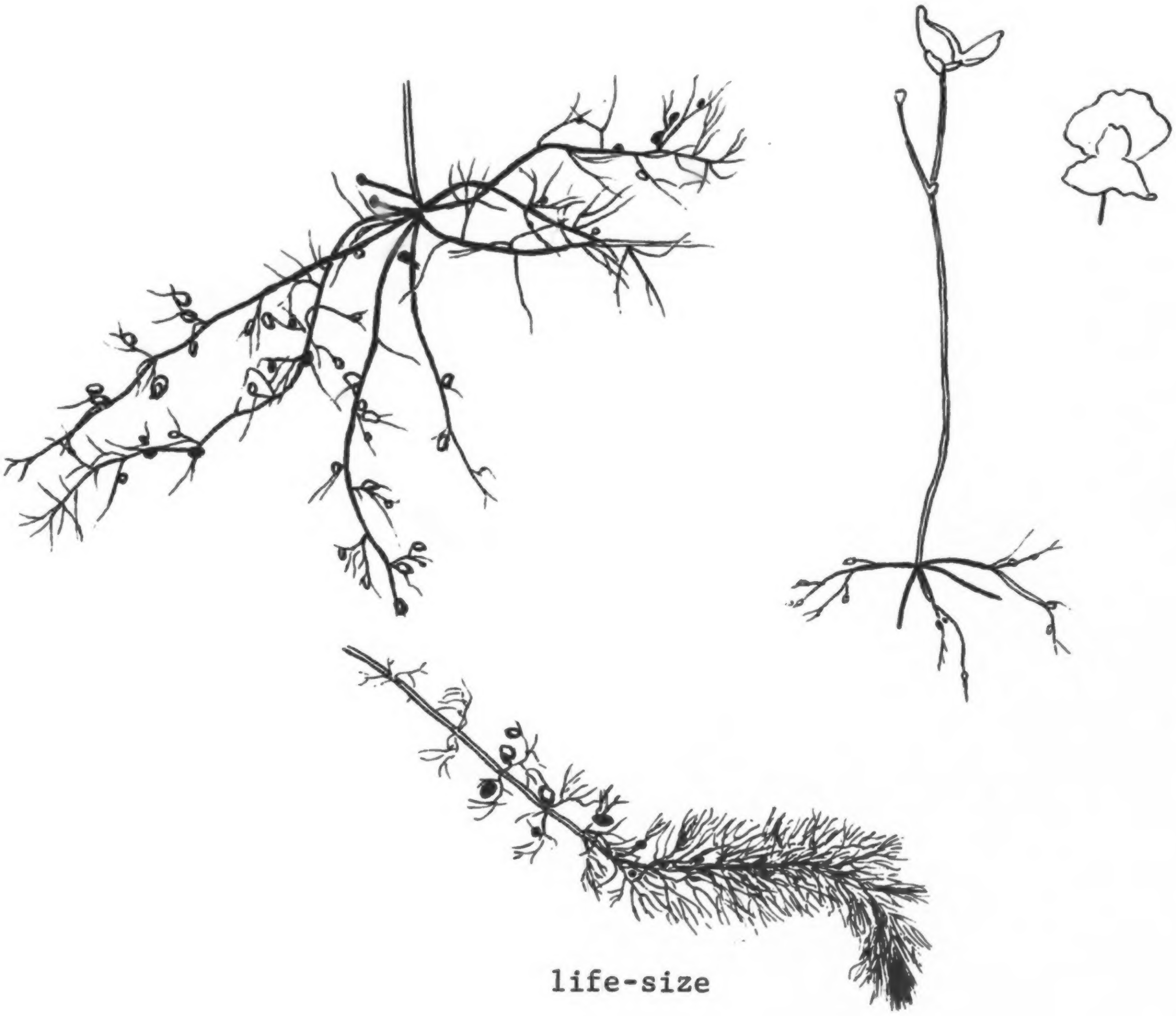
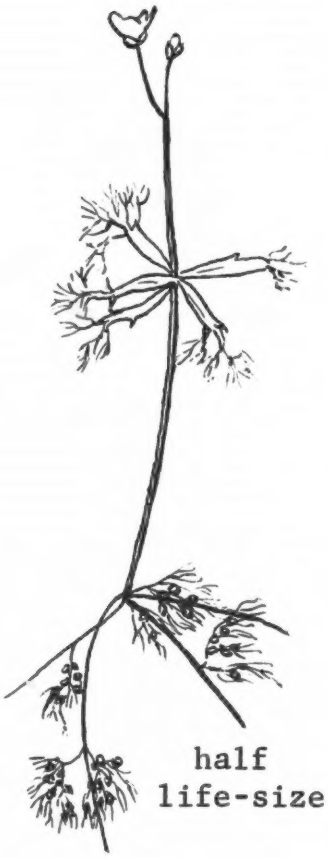


EASTERN BLADDERWORT, Utricularia gibba
(Utricularia biflora, fibrosa, and pumila)

Fresh water; California; and Minnesota to Nova Scotia, Texas, and Florida.

Foliage is dense or sparse; is mixed with bladders, or foliage and bladders are on separate branches. Flowers are yellow.



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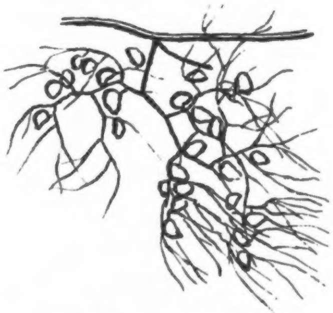


life-size

LITTLE FLOATING BLADDERWORT, Utricularia radiata (Utricularia inflata var. minor)

Fresh water; Indiana to Nova Scotia, Texas, and Florida.

Most of the plant is under water; but its flowers stand above a whorl of swollen, oblong, floating leaves which have fine-forked ends. Flowers are yellow.

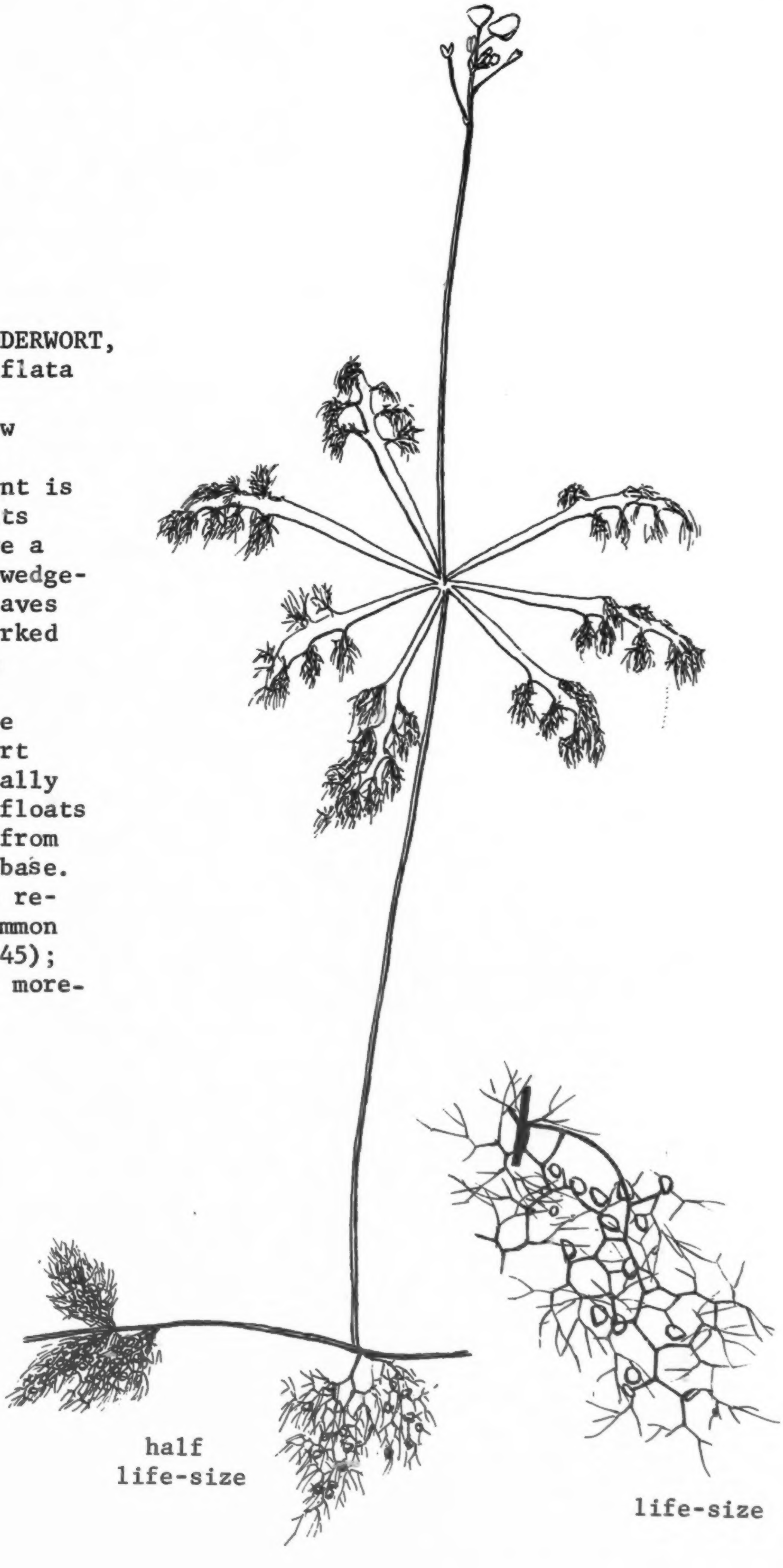
Resembles Big Floating Bladderwort (page 49); but usually is smaller, and its floats have nearly parallel sides which pinch in near their base. Underwater foliage resembles that of Common Bladderwort (page 45); but it usually has more-zigzag forking and smaller bladders.

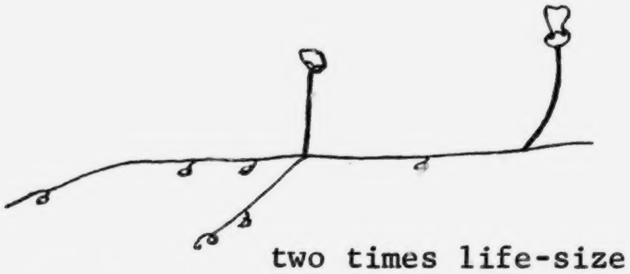
BIG FLOATING BLADDERWORT, Utricularia inflata

Fresh water; New Jersey to Texas.

Most of the plant is under water, but its flowers stand above a whorl of swollen, wedge-shaped floating leaves which have fine-forked ends. Flowers are yellow.

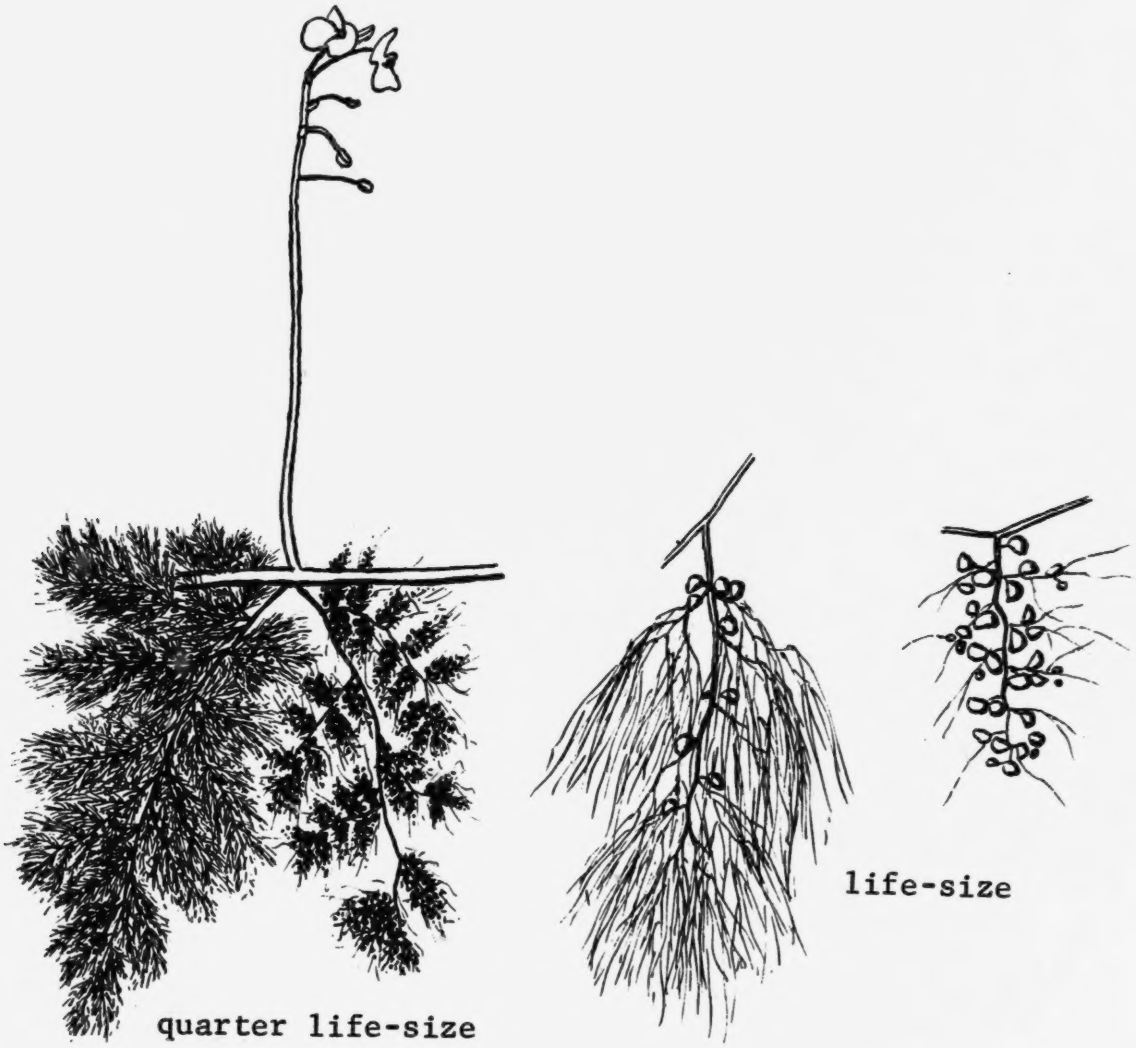
Resembles Little Floating Bladderwort (page 48); but usually is larger, and its floats taper all the way from the middle to the base. Underwater foliage resembles that of Common Bladderwort (page 45); but it usually has more-zigzag forking.





DWARF BLADDERWORT,
Utricularia olivacea
(Biovularia olivacea)

A tiny plant with whitish flowers which has been found at one locality each in New Jersey, North Carolina, South Carolina, Georgia, and Florida.



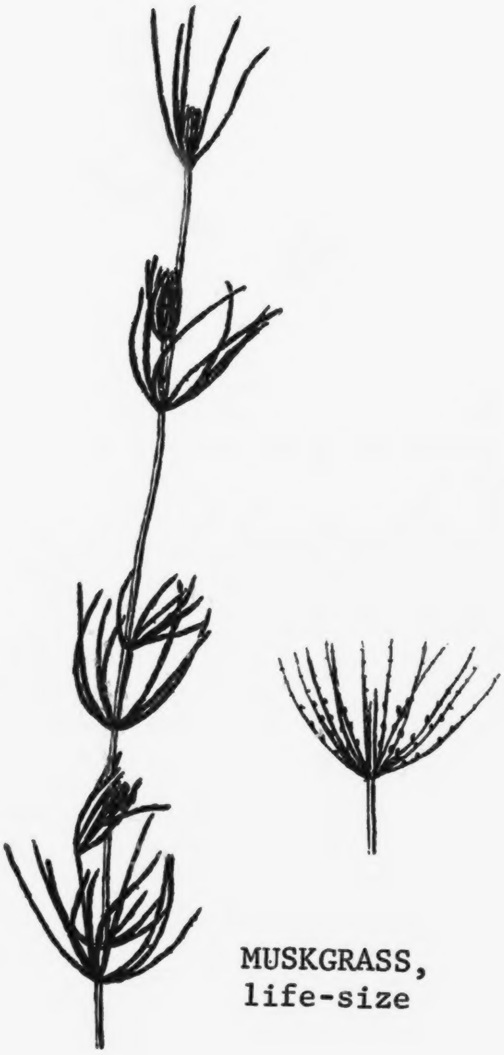
GIANT BLADDERWORT, Utricularia foliosa
(Utricularia floridana)

Fresh water; Louisiana to Georgia and Florida.

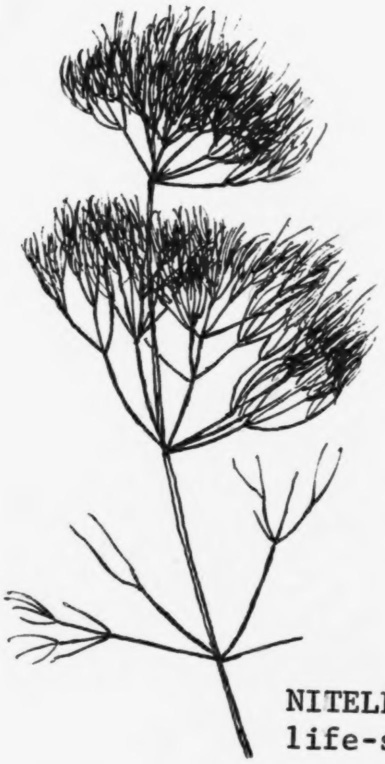
From a few feet to twenty feet long. Has flattish stems with two kinds of branches. One kind is a mass of threadlike green leaflets with a few interspersed bladders. The other is a mass of colorless to blackish bladders with a few interspersed leaflets. Flowers are yellow.

2

Group 5. PLANTS WITH CLUSTERED BRANCHES OR FINE-FORKED, BLADDERLESS, USUALLY LIMP LEAVES ON FLEXIBLE UNDERWATER STEMS; STEM TIPS SOMETIMES STICKING OUT OF WATER grow in fresh inland water and in fresh to brackish coastal water. The stems vary from upright to horizontal and from a few inches long to several feet; and they are usually branched. The underwater leaves usually collapse when taken out of water. Some kinds produce small floating or out-of-water leaves and have white, yellow, or purplish flowers at the surface of the water or a little above it.



MUSKGRASS,
life-size



NITELLA,
life-size

MUSKGRASSES, Chara; NITELLAS, Nitella; TOLYPELLAS, Tolypella

Fresh to brackish water, inland and coastal; Alaska to Greenland, California, and Florida.

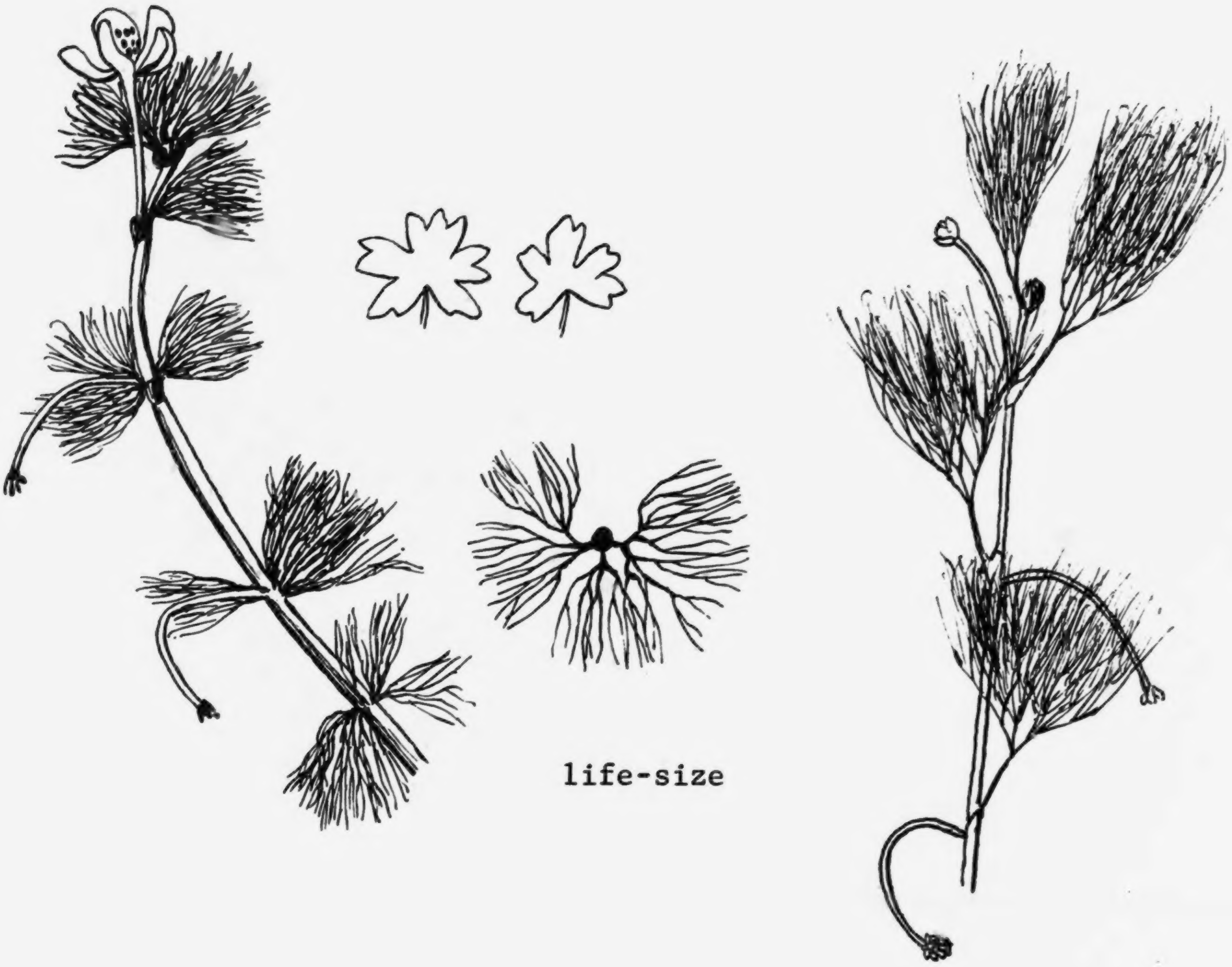
Identifying these algae, which mingle with flowering plants and resemble some of them, requires a microscope and Richard D. Wood and Kozo Imahori's "A Revision of the Characeae" (1964-65). These two volumes include pictures and descriptions of all of the kinds of Characeae known from Canada and the United States: eight Muskgrasses, twelve Nitellas, and two Tolypellas.

The different kinds vary from larger than those pictured here to much smaller, and from more branched to less branched.

Muskgrasses usually have short, even-length branches clustered at each joint; and these usually have clusters of much-shorter branchlets. Usually the plants have a skunky odor; often they are coated with lime; and sometimes they are prickly-looking.

Nitellas have short, even-length branches clustered at each joint; and these branches often end in bushy clusters of branchlets. The plants seldom have a skunky odor or a coating of lime.

Tolypellas (not pictured) have short branches of different lengths clustered at each joint; therefore they look ragged.

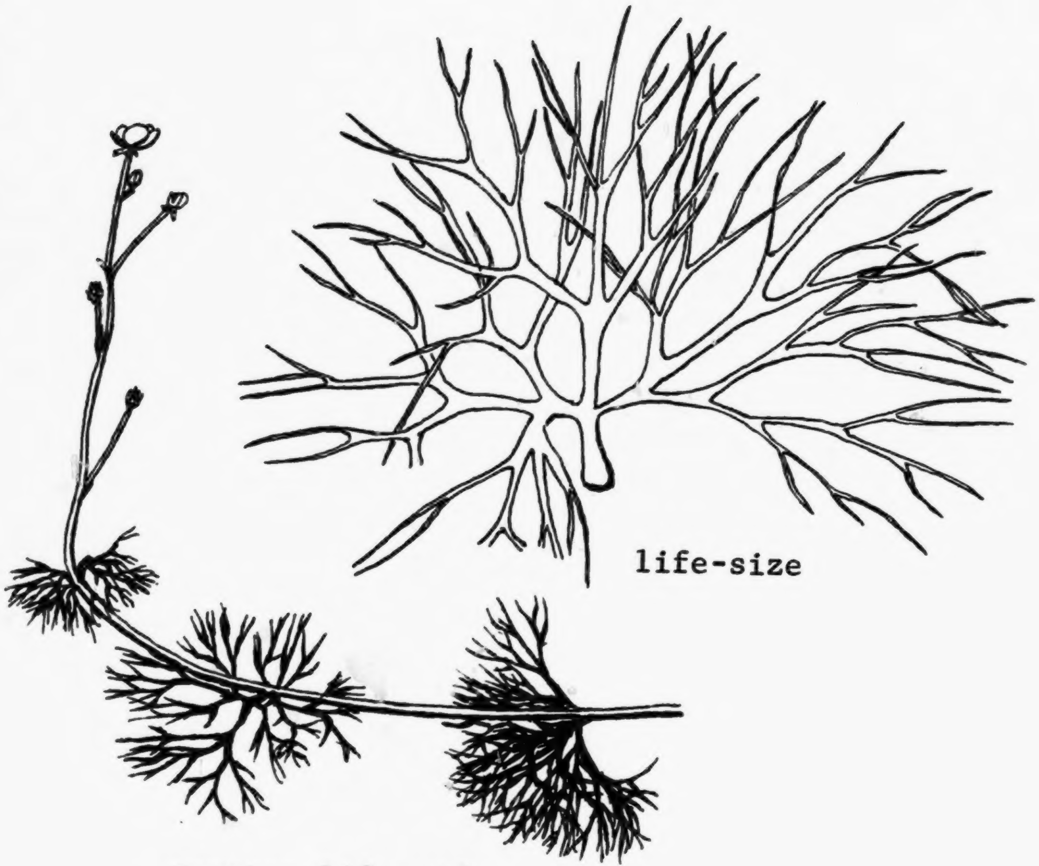


WHITE WATER BUTTERCUP, Ranunculus aquatilis
(Ranunculus longirostris, subrigidus, and trichophyllus;
Batrachium flaccidum and trichophyllum)

Fresh water, often in slow streams; Alaska to Greenland, California, and Alabama (but rare in the southeastern states).

Stems usually just under water. Leaves firm to limp, stalkless to long-stalked; a single stalkless leaf sometimes looking like a cluster of several leaves. Sometimes stems have a few floating leaves. In summer, 5-petaled flowers often whiten a patch of water. Their stalks soon curve back into the water and are tipped with little balls of usually a dozen or more seeds. During low water in summer, patches of stems sometimes grow on mud.

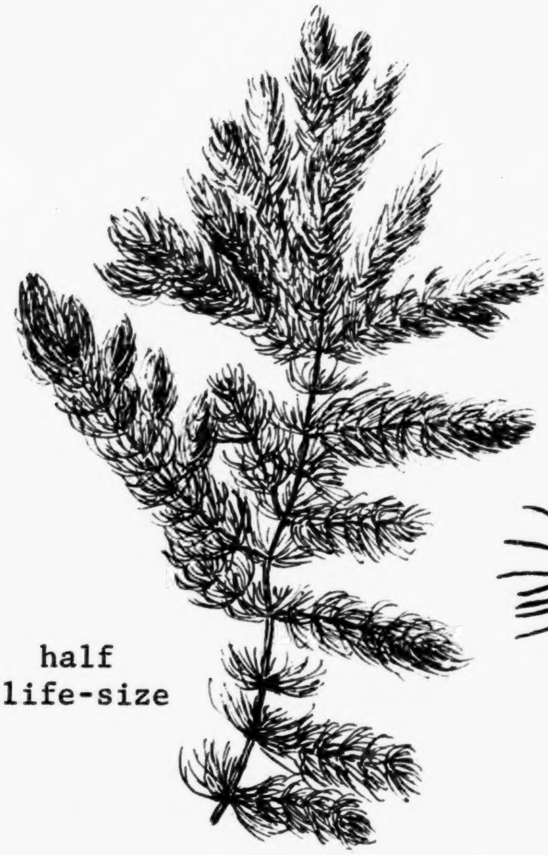
Resembles Lobb Buttercup (page 113), which has mainly floating leaves, fewer seeds in a ball, and grows only from British Columbia to California.



YELLOW WATER BUTTERCUP, Ranunculus flabellaris
(Ranunculus delphinifolius and gmelini)

Fresh water; Alaska to Newfoundland, California, Louisiana, and North Carolina (but rare in the southeastern states).

Stems usually just under water. Sometimes stems have firmer, less-divided floating leaves or out-of-water leaves. In late spring and summer, loose clusters of 5-petaled yellow flowers stand a little above water.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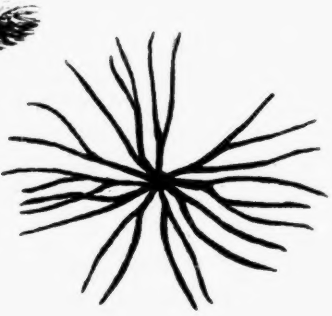
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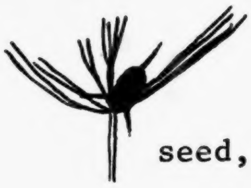
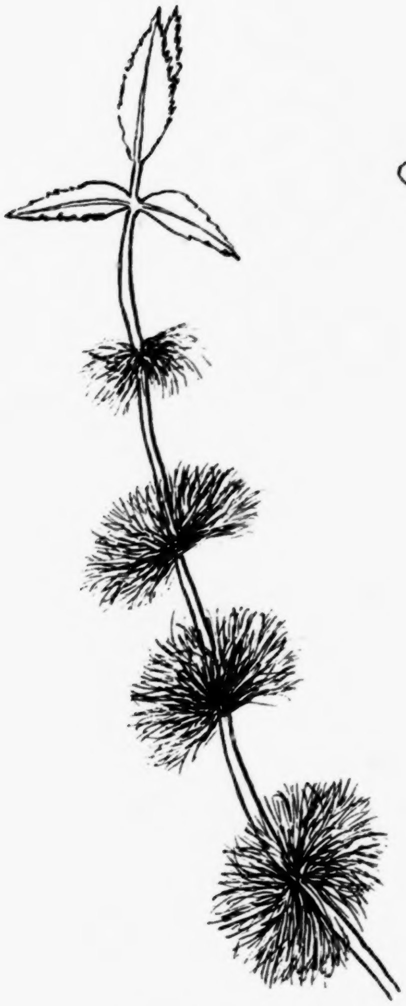

seed, life-size

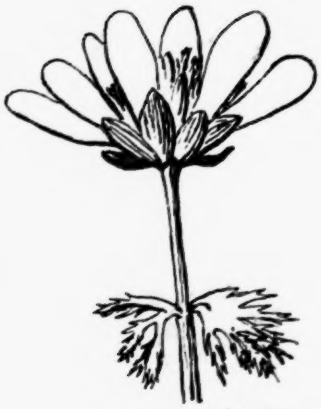
COONTAIL, Ceratophyllum demersum
(Ceratophyllum echinatum and submersum)

Fresh water, inland and coastal; Northwest Territories to Nova Scotia, California, and Florida.

Stems entirely under water; usually much-branched, and sometimes stiff with a coating of lime. At each joint is a whorl of leaves. Leaflets vary in length, width, firmness, amount of forking, and prominence of teeth. Flowers and seeds, at base of leaves, are usually hard to find. The commonest form of seed is pictured. Other forms have as many as a dozen spines.



half life-size



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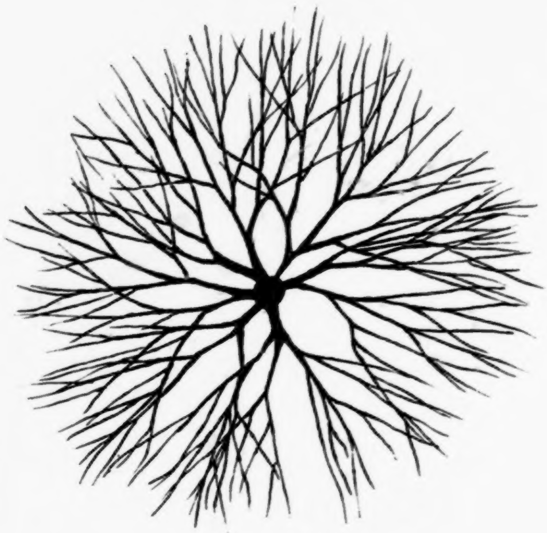


life-size

WATER-MARIGOLD, Bidens beckii (Megalodonta beckii)

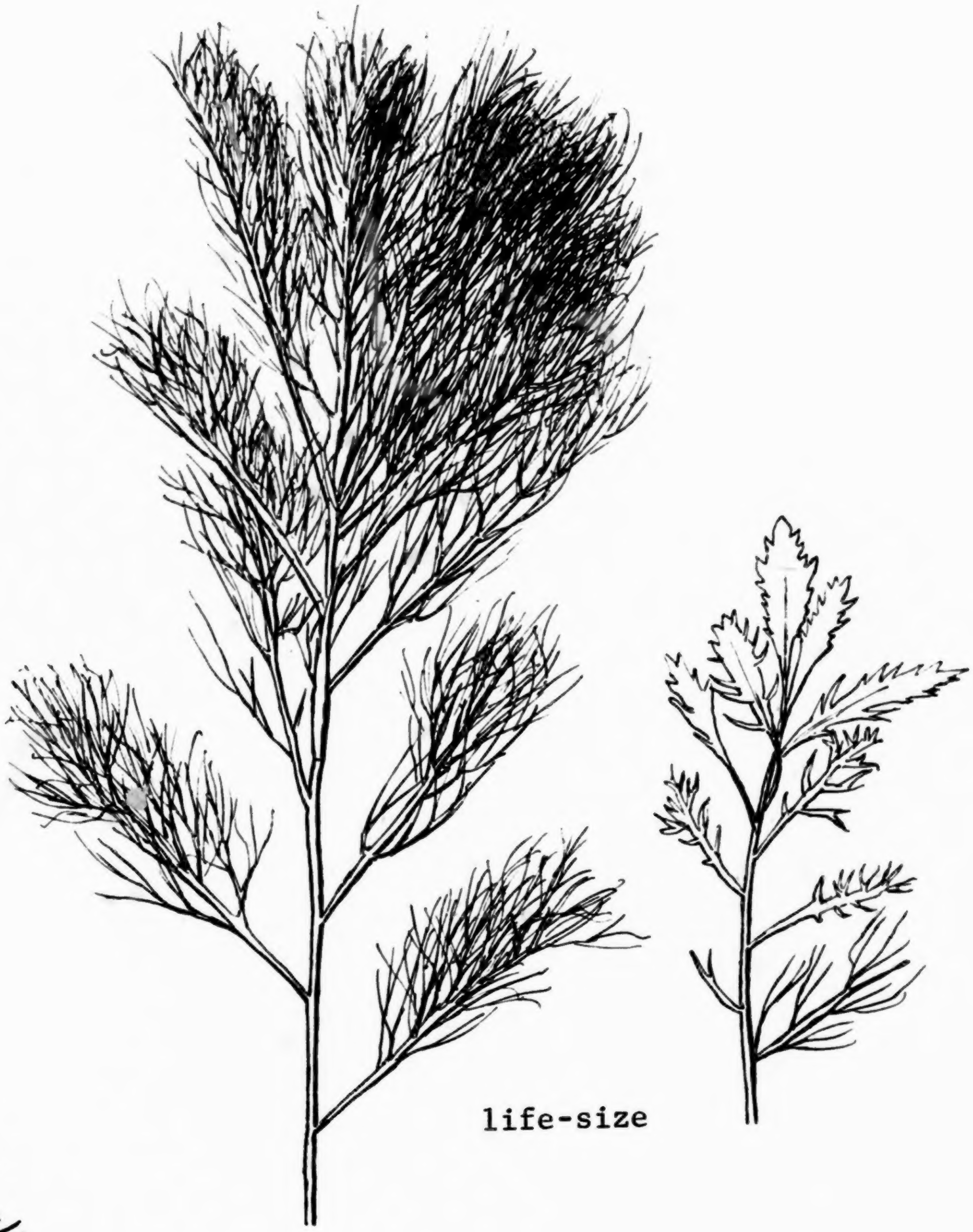
Fresh water; Washington and Oregon; and Saskatchewan to Nova Scotia, Missouri, and New Jersey.

The stalkless leaves, in pairs at each joint, look like a cluster of several leaves. Stem tips with two or three pairs of less-divided or merely toothed leaves and a yellow flower head reach a little out of water.

LAKE CRESS,
Armoracia aquatica
(Neobeckia aquatica)

Fresh water; Minnesota to Quebec, Louisiana, and Florida (but rare south of Missouri and New York).

Stems which grow under water have fine-forked leaves, the leaflets of which are uneven-ended. Stems or stem tips which grow out of water have leaves which vary from fine-forked to undivided. Sometimes these out-of-water stems have loose clusters of white flowers.



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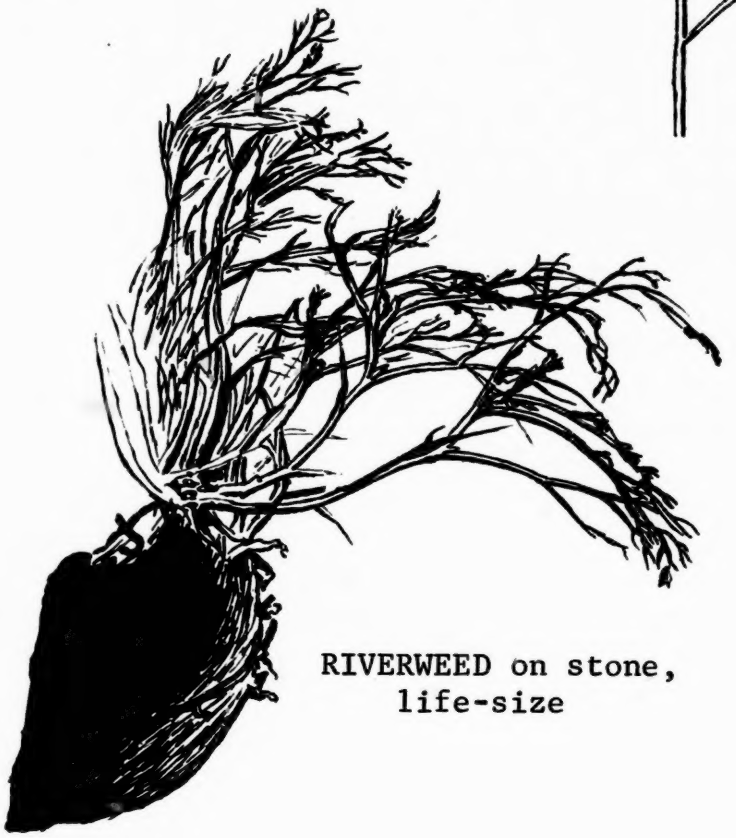
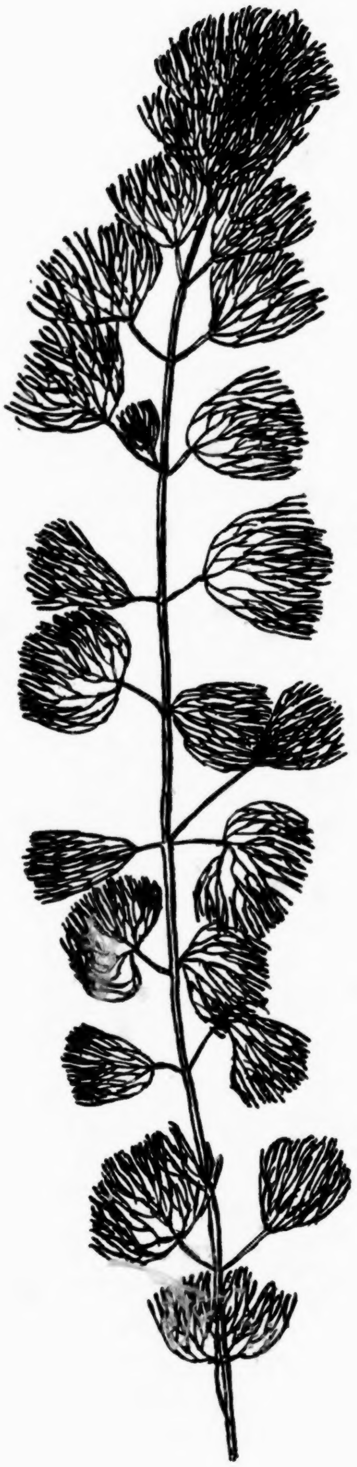


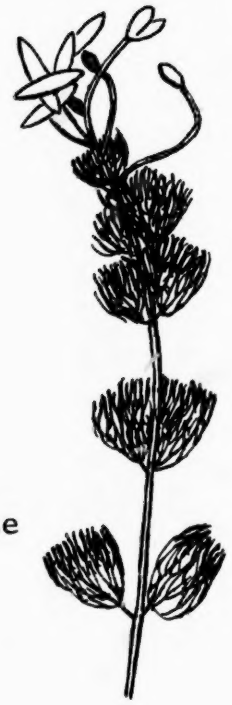
RIVERWEED on stone, life-size

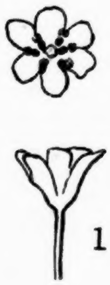
RIVERWEED,
Podostemum ceratophyllum
(Podostemon abrotanoides
and ceratophyllum)

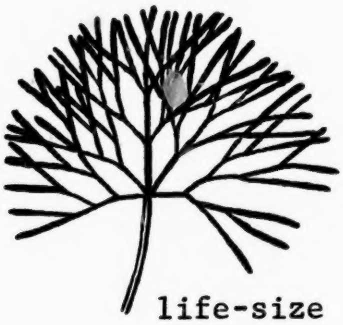
Stony-bottom streams, Quebec to New Brunswick, Texas, and Georgia.

Tough stems grow in a dull-green tangle. Their bases cling to stones instead of rooting among them.





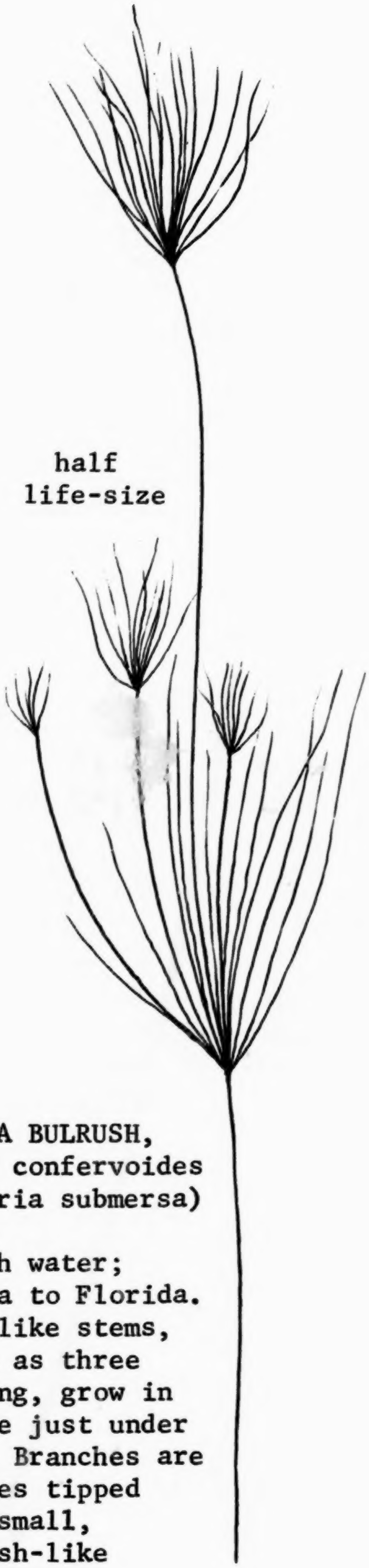




FANWORT,
Cabomba caroliniana

Fresh water; Michigan to New Hampshire, Texas, and Florida.

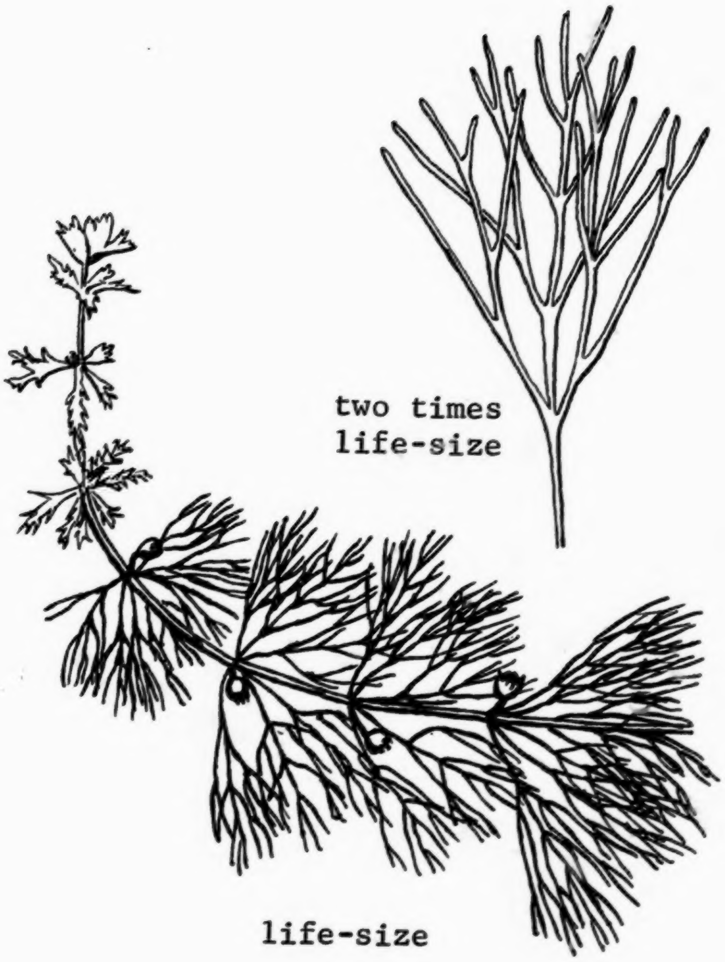
Leaves are on short or long stalks which are in pairs at each joint. Unlike most other underwater plants, the forked leaflets are a little wider at the tip than the base. Six-parted white or lavender flowers and small, narrow floating leaves are at the tip of stems which reach the surface of the water.



ALGA BULRUSH,
Scirpus confervoides
(Websteria submersa)

Fresh water; Virginia to Florida.

Hairlike stems, as much as three feet long, grow in a tangle just under water. Branches are sometimes tipped with a small, spikerush-like flower head.

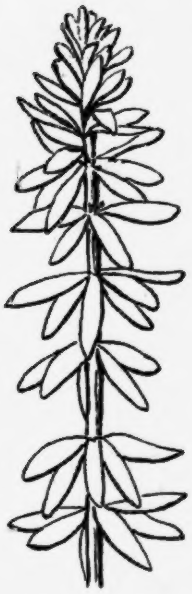


LIMNOPHILAS, Limnophila

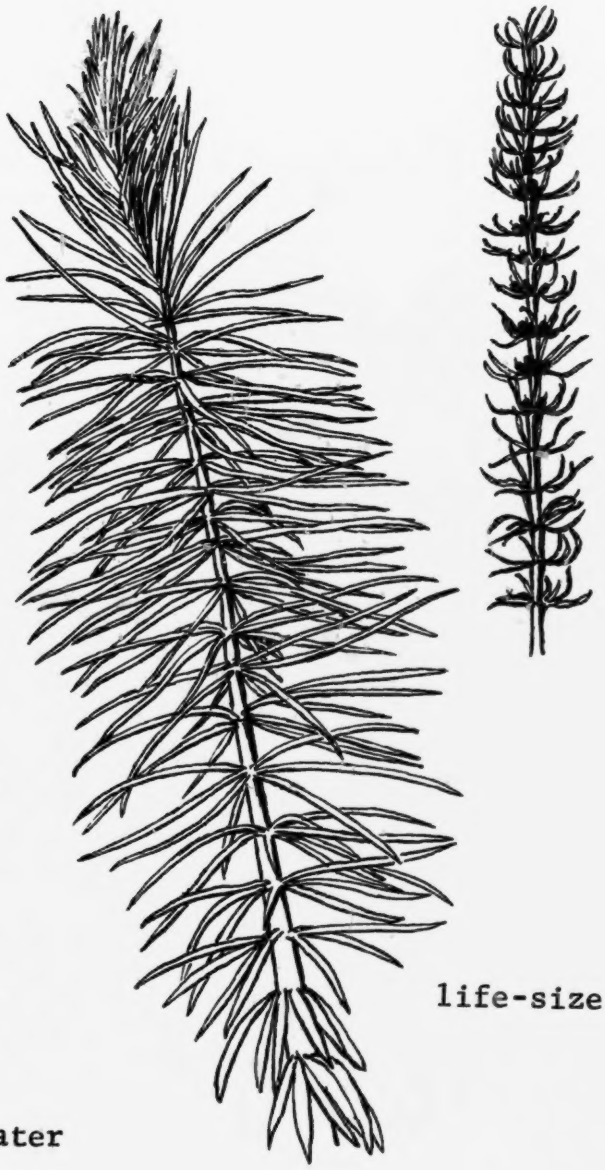
Limnophila indica and Limnophila sessiliflora, natives of southeastern Asia, are grown in North America as aquarium plants and have run wild in fresh water in Texas, Louisiana, and Florida.

Out-of-water foliage looks a little like that of Variable Watermilfoil (page 35); but among the leaves are purplish flowers which produce stalkless or short-stalked pods filled with tiny seeds. Underwater foliage looks a little like that of Fanwort (page 58); but the leaves are in clusters instead of twos; and the leaflets are not wider at the tip than the base.

Group 6. PLANTS WITH NEEDLELIKE TO OVAL PAIRED OR BUNCHED LEAVES ON MAINLY FLEXIBLE UNDERWATER STEMS; SOME KINDS SOMETIMES OUT OF WATER grow in fresh inland water and in fresh to brackish coastal water. The stems vary from upright to horizontal and from an inch high to several feet long; and they are usually branched. The leaves of some kinds are limp and collapse when taken out of water; those of others are stiff. Plants grow all the way to shore from depths of several feet. Several species are hard to tell apart without seeds; but seeds are usually common in summer.



brackish-water
plant,
life-size

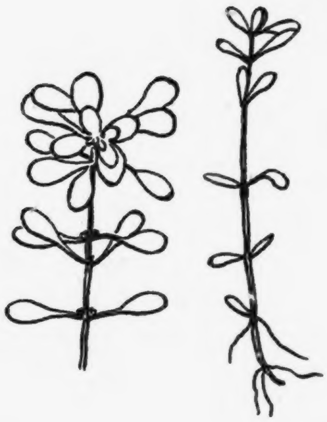


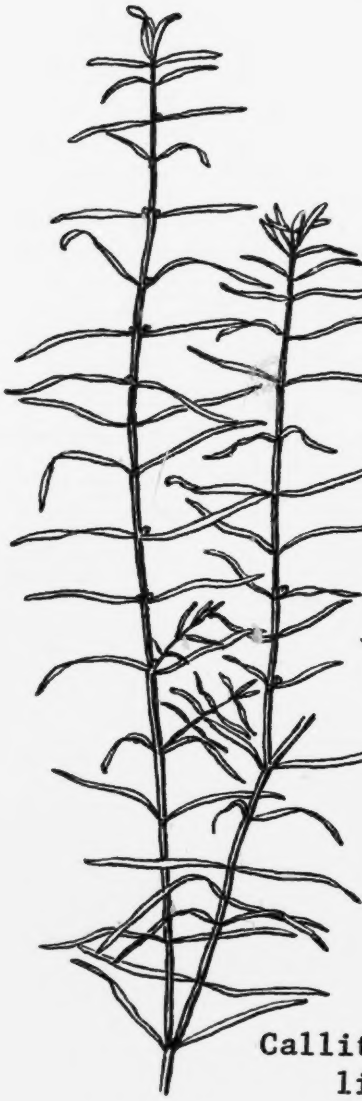
life-size

MARESTAIL,
Hippuris vulgaris
(Hippuris tetraphylla)

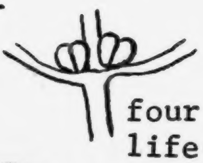
Fresh inland water and brackish coastal water; Alaska to Greenland, California, New Mexico, Iowa, and New York.

Usually upright and at least partly out of water. Flowers and seeds are at base of leaves.

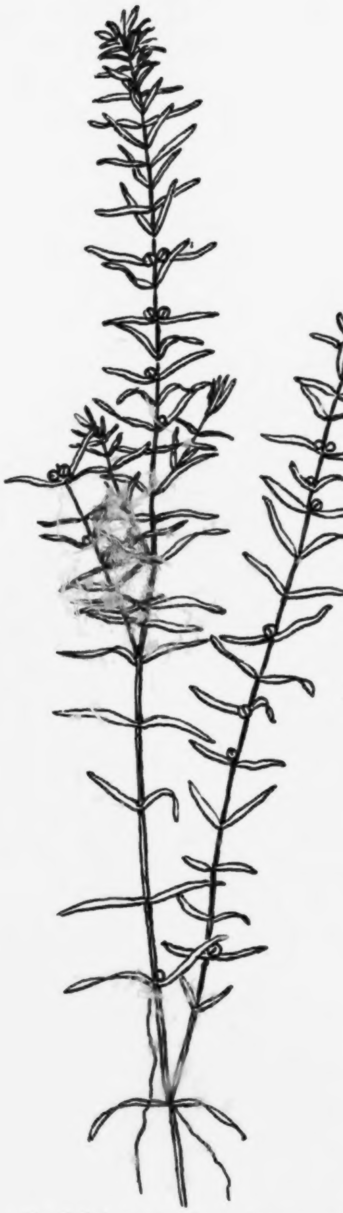




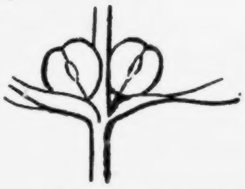
Callitriche verna
life-size



four times
life-size



Callitriche hermaphroditica,
life-size



four-times
life-size

WATER-STARWORTS, Callitriche

Fresh water, inland and rarely coastal, often in partly-shaded streams; Alaska to Greenland, California, and Florida.

Four kinds resemble each other so much that they can be told apart only by looking at them with a hand lens or microscope when they have seeds. These are partly-joined to each other in fours at the base of leaves. Under water, each of these plants has narrow leaves. All except Callitriche hermaphroditica also often reach the surface and there produce a cluster of oval floating leaves; and during low water they grow on mud and have oblong leaves.

Under water, when without flowers or seeds, Water-starworts resemble slim plants of Common Elodea (page 66); but the leaves are bunched only a little toward the tip of stems, and there are only two leaves at a joint.

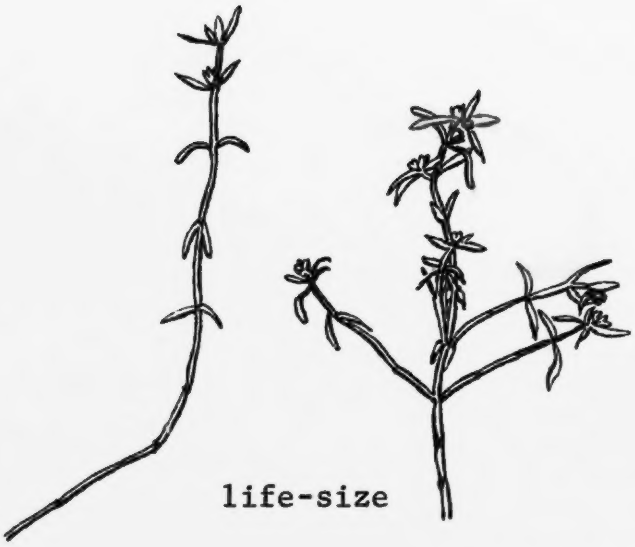
The four kinds are:

Callitriche hermaphroditica (Callitriche autumnalis). Alaska to Newfoundland, California, Colorado, and New York. Has only narrow, underwater leaves which are shorter than the underwater leaves of the other Water-starworts. Seeds are more than 1/16 inch long.

Callitriche longipedunculata. Not pictured. California. Seeds are less than 1/16 inch long and are on a stalk which is usually longer than the seeds.

Callitriche stagnalis. Not pictured. A native of Europe which has run wild from British Columbia to Oregon; and Wisconsin to Quebec and Maryland. Usually has some oval leaves. Seeds are more than 1/16 inch long.

Callitriche verna (Callitriche anceps, heterophylla, and palustris). Alaska to Greenland, California, and Florida. Seeds are less than 1/16 inch long and have little or no stalk.



TILLAEA, Tillaea aquatica
(Tillaeastrum aquaticum)

Fresh inland water; Alaska to Northwest Territories, California, and Louisiana. And fresh to slightly brackish coastal water; Quebec to Newfoundland and Maryland; and Alabama.

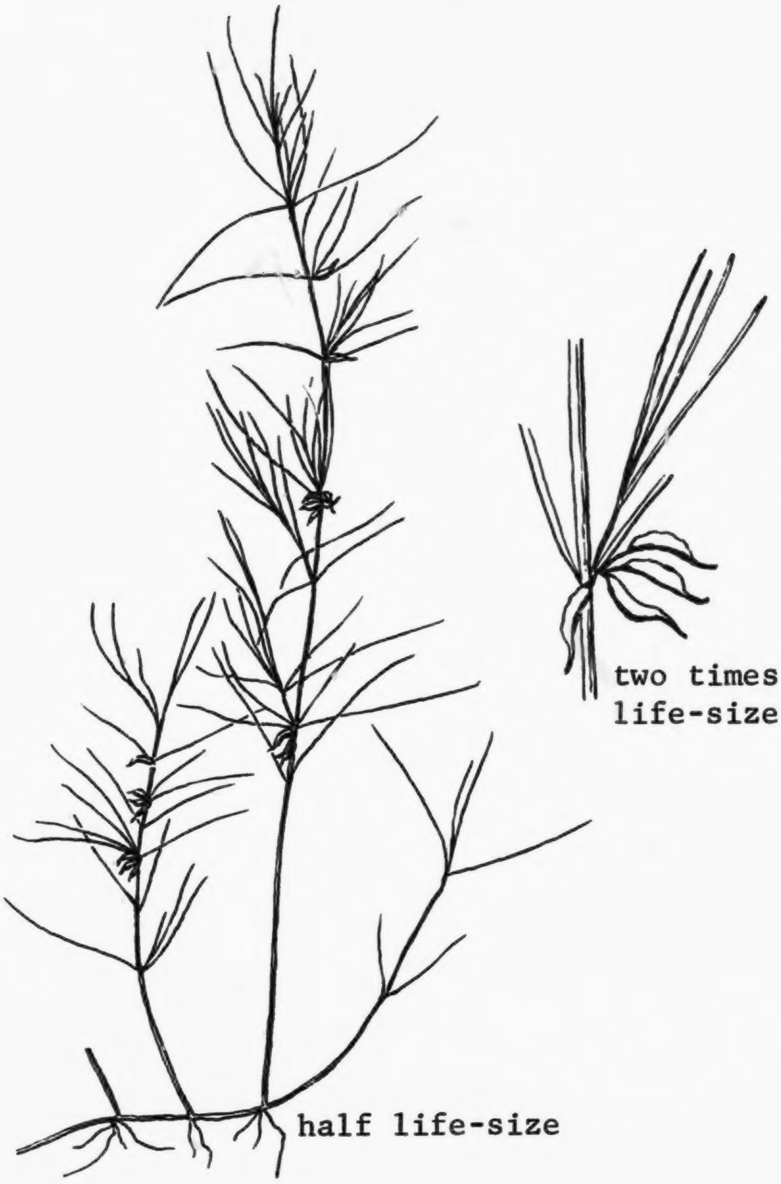
Under water or partly out of water; often under water at high tide. Tiny greenish-white flowers are on very short stalks at base of leaves.

HORNED-PONDWEED
Zannichellia palustris

Fresh and alkali inland water and fresh and brackish coastal water; Alaska to Newfoundland, California, and Florida.

From spring to fall a person can usually find the seeds, which are unlike those of any other plant.

Without seeds, Horned-pondweed resembles Slender (page 75), Leafy (page 77), Snailseed (page 78), and Vasey (page 80) Pondweeds; but it has leaves in pairs at all the joints of a stem.


two times life-size

half life-size

WATERWORTS, Elatine

Fresh water, inland and coastal; Northwest Territories to Newfoundland, California, and Georgia.

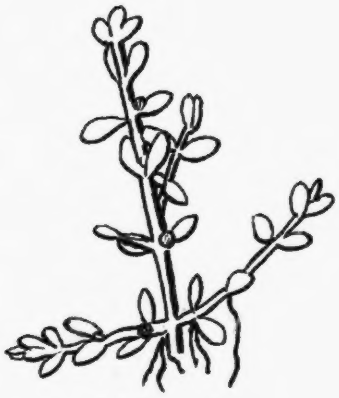
Three kinds resemble each other so much that they can be told apart only by using a microscope to look at the shape of seeds and the shape of their surface markings. The seeds are in pinhead-sized, transparent-walled pods at the base of leaves.

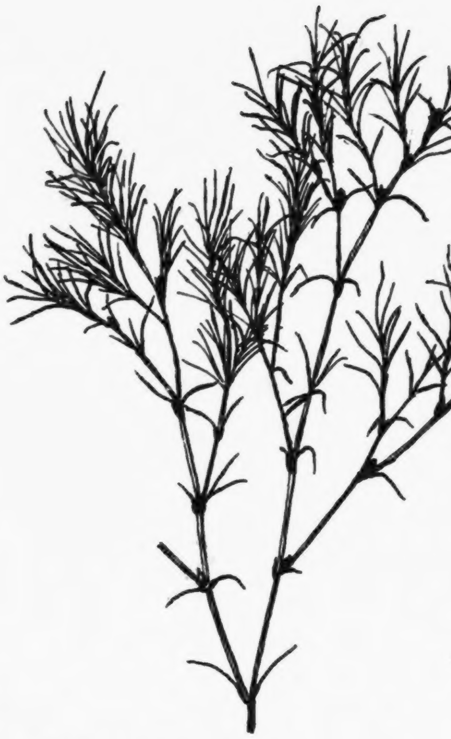
The three kinds are:

Elatine californica. Washington to Montana, California, and Arizona.

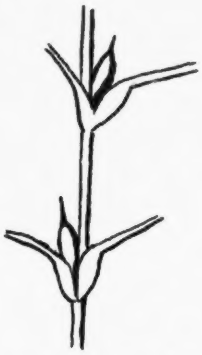
Elatine minima. Minnesota to Newfoundland and Virginia

Elatine triandra (Elatine ambigua, americana, brachysperma, chilensis, gracilis, heterandra, obovata, and rubella). Northwest Territories to New Brunswick, California, and Georgia.


life-size



Najas flexilis, half life-size



two times life-size

NAIADS, Najas
(except SPINY NAIAD, page 67)

Fresh inland water and fresh to slightly brackish coastal water; British Columbia to Newfoundland, California, and Florida.

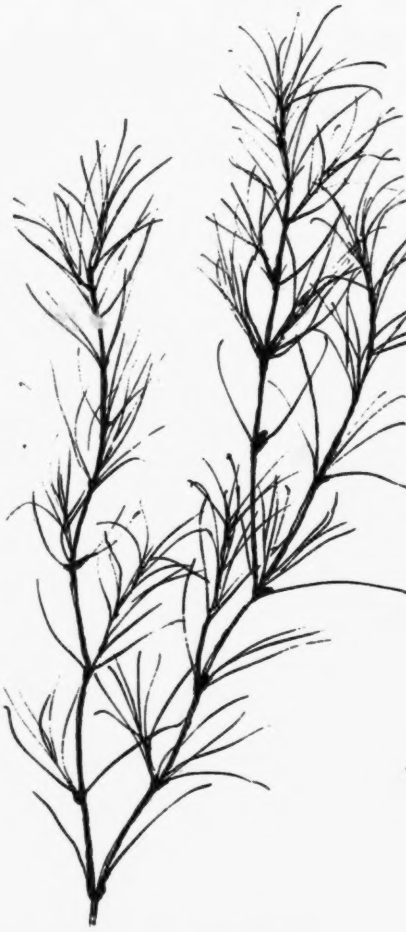
Six kinds resemble each other so much that they can be told apart only by using a hand lens or microscope to look at the toothing of leaf edges, the shape and toothing of leaf bases, and the markings on seeds. Tops of plants are often almost out of sight under water. Plants vary in size from tufts an inch high on sandy bottom to much-branched plants two or three feet high on silty bottom.

The six kinds are:

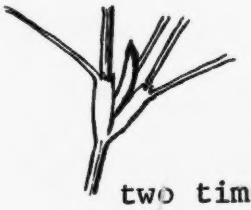
Najas conferta. Not pictured. Southwestern Georgia and western Florida. Leaves usually curve out from the stem, and their marginal teeth are visible to the naked eye. Resembles minor (page 65); but the seeds are not ribbed lengthwise.

Najas flexilis. British Columbia to Newfoundland, California, Missouri, and Virginia. Leaves usually curve out from the stem. Unlike the other kinds, its seeds are shiny under the dull, easily-rubbed-off skin.

Najas gracillima. Minnesota to Maine, Missouri, and North Carolina. Threadlike leaves usually curve out from the stem. Resembles flexilis; but usually has slenderer



Najas gracillima, half life-size



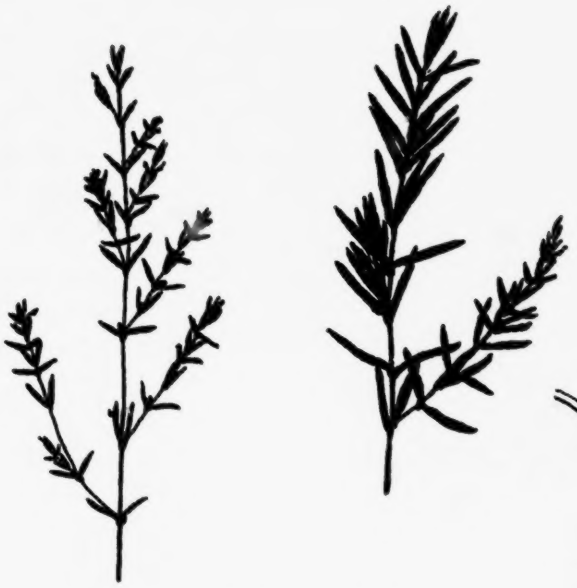
two times life-size

leaves and has wide-topped leaf bases and dull seeds.

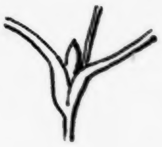
Najas graminea. Not pictured. A native of the Old World which has run wild in California ricefields. Very bushy with leaves which usually curve out from the stem. Resembles flexilis (page 64); but has dull seeds.

Najas guadalupensis (Najas muenscheri and olivacea). Oregon to Quebec, California, and Florida. Leaves are shorter than in the other kinds, usually do not curve outward, and are not much bunched. When without seeds, guadalupensis resembles underwater forms of Water-starwort (page 61); but the leaves have sheathing bases.

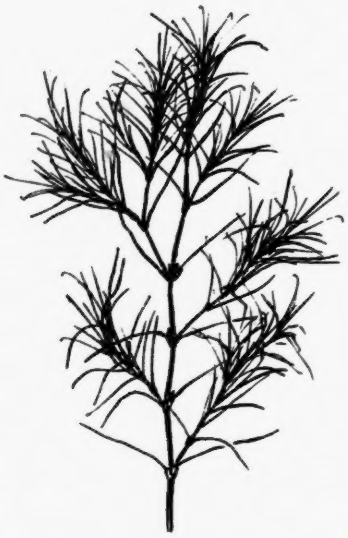
Najas minor. Illinois to Vermont, Alabama, and Florida. A native of Eurasia which in the last forty years has become common in the tidal Hudson River and in artificial lakes. Leaves usually curve outward, and their marginal teeth are visible to the naked eye. Unlike the other kinds, its seeds are ribbed lengthwise.



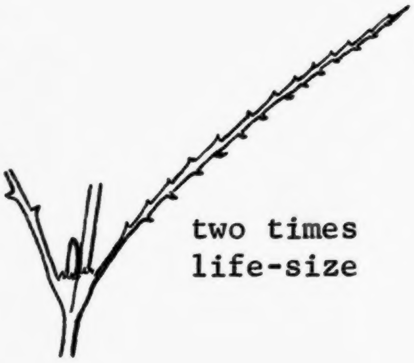
Najas guadalupensis, half life-size



two times life-size



Najas minor, half life-size



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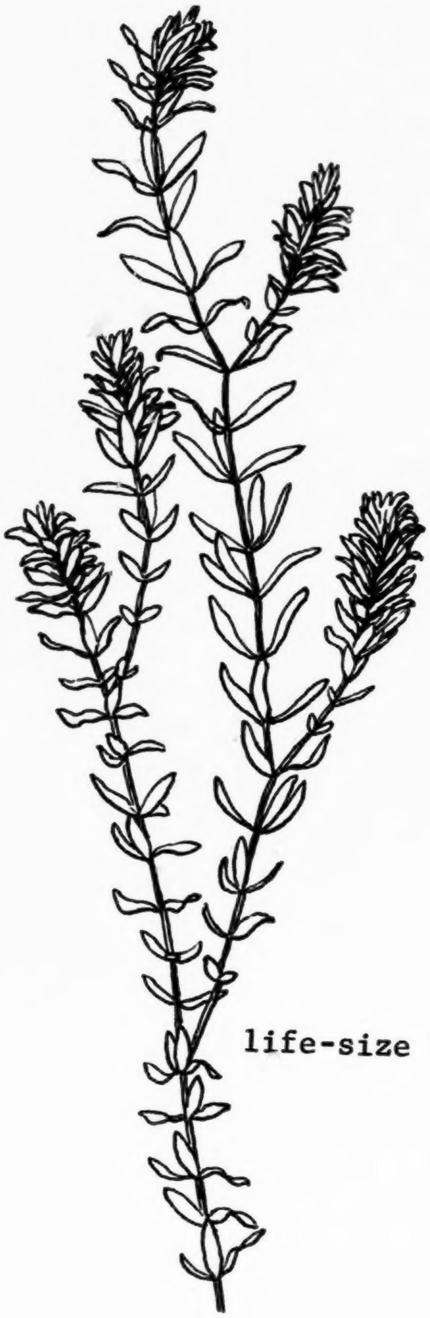


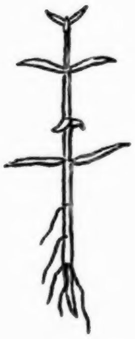
life-size

COMMON ELODEA, Elodea canadensis (Elodea nuttallii; Philotria canadensis and linearis)

Fresh to slightly alkali inland water and fresh to slightly brackish coastal water; British Columbia to Quebec, California, and Florida.

Leaves vary greatly in width, size, and bunching; therefore plants are often slimmer or stouter than as pictured. Sometimes there are slim seed pods at the base of leaves.

Big plants resemble small plants of South American Elodea (page 68); but toward the tip of stems the leaves of Common are in twos or threes at a joint, those of South American are in fours or fives. Plants with narrow, limp leaves resemble underwater forms of Water-starworts (page 61); but Elodea leaves are bunched toward the tip of stems and usually are in threes at a joint. Resembles large plants of Micranthemum (page 70); but Elodea leaves are usually bunched at the end of branches.



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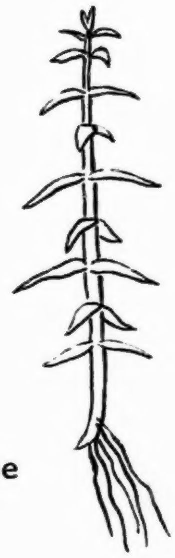
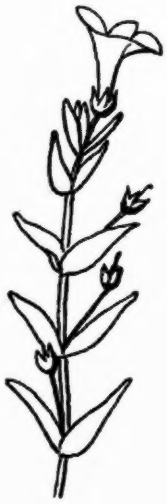




life-size

GOLDENPERT, Gratiola aurea

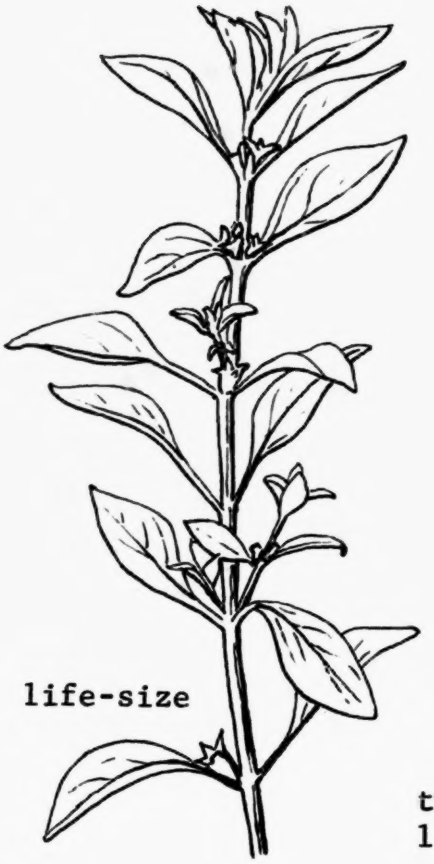
Fresh water; Wisconsin to Newfoundland, Alabama, and Florida (but only near the coast in the southeastern states).

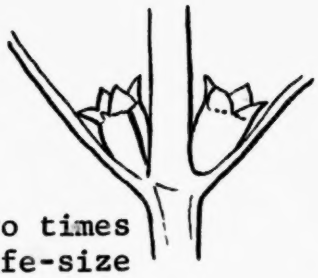
Sometimes grows in several feet of water, where it is an inch or two high and has sharp-tipped leaves and no flowers. Usually grows out of water or partly out; then is bigger and has blunt-tipped leaves and yellow flowers.

MARSH-PURSLANE,
Ludwigia palustris
(Ludwigia natans; Isnardia intermedia, palustris, and repens)

Fresh water; British Columbia to Nova Scotia, California, and Florida.

Usually sprawls on wet ground or partly under water; but sometimes in clear springs and spring-fed streams it has about the same appearance as when it grows out of water.

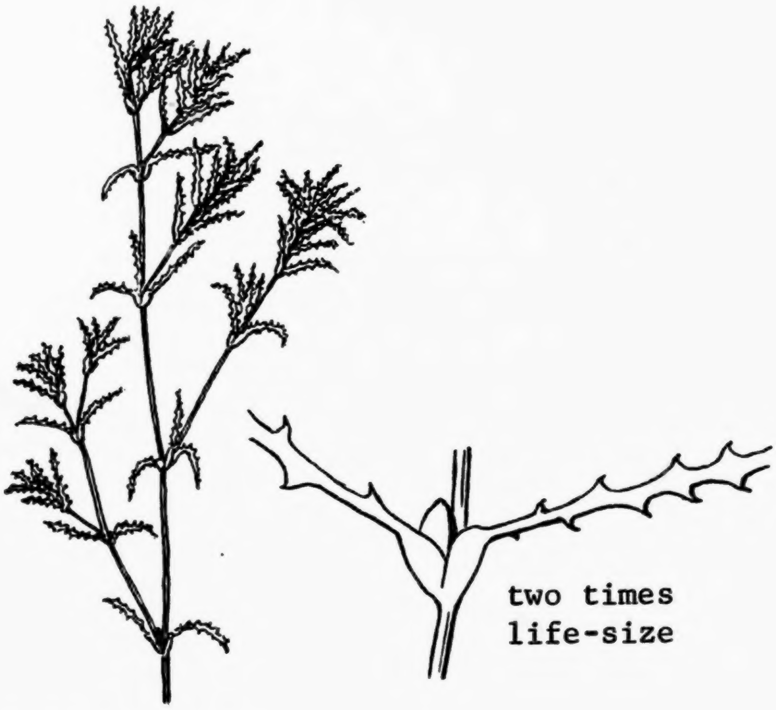

life-size


two times life-size

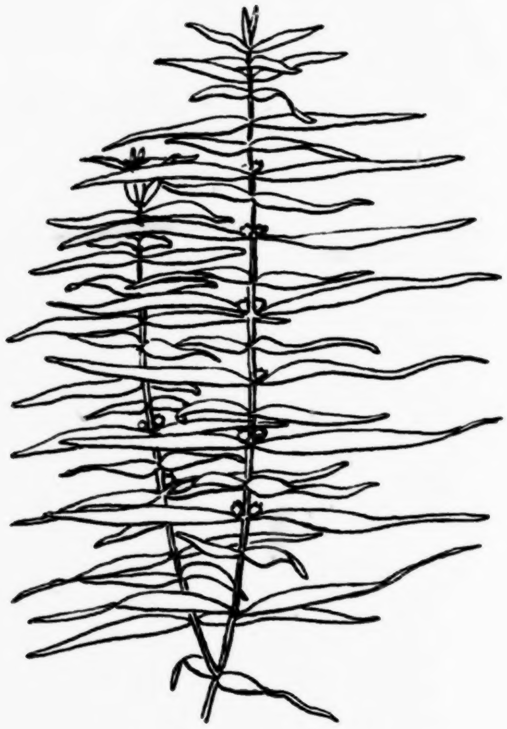
SPINY NAIAD, Najas marina
(Najas gracilis)

Fresh, brackish, and alkali inland water, and rarely brackish coastal water; California to Utah and Arizona; North Dakota to New York; southern Texas; and Florida.

Varies greatly in coarseness; but teeth are conspicuous on the leaves of even the smallest, slimmest plants.


two times life-size

half life-size



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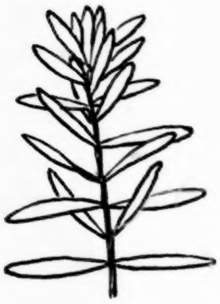
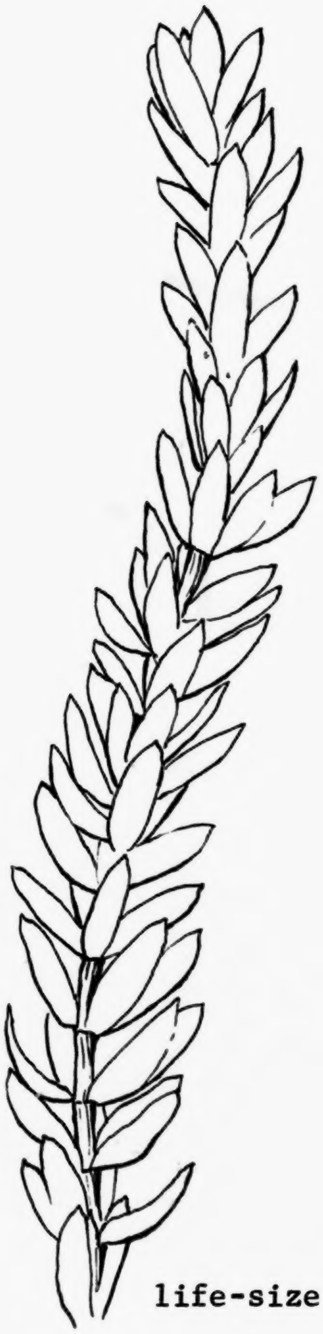


life-size

WATER-PURSLANE, Peplis diandra
(Didiplis diandra)

Fresh water; Wisconsin to Virginia, Texas, and Florida.

Under water or out of water. Underwater leaves are limp and ribbonlike. Out-of-water leaves are stiffer and shorter. Often has ball-like seed pods, less than 1/8 inch across, at the base of leaves.



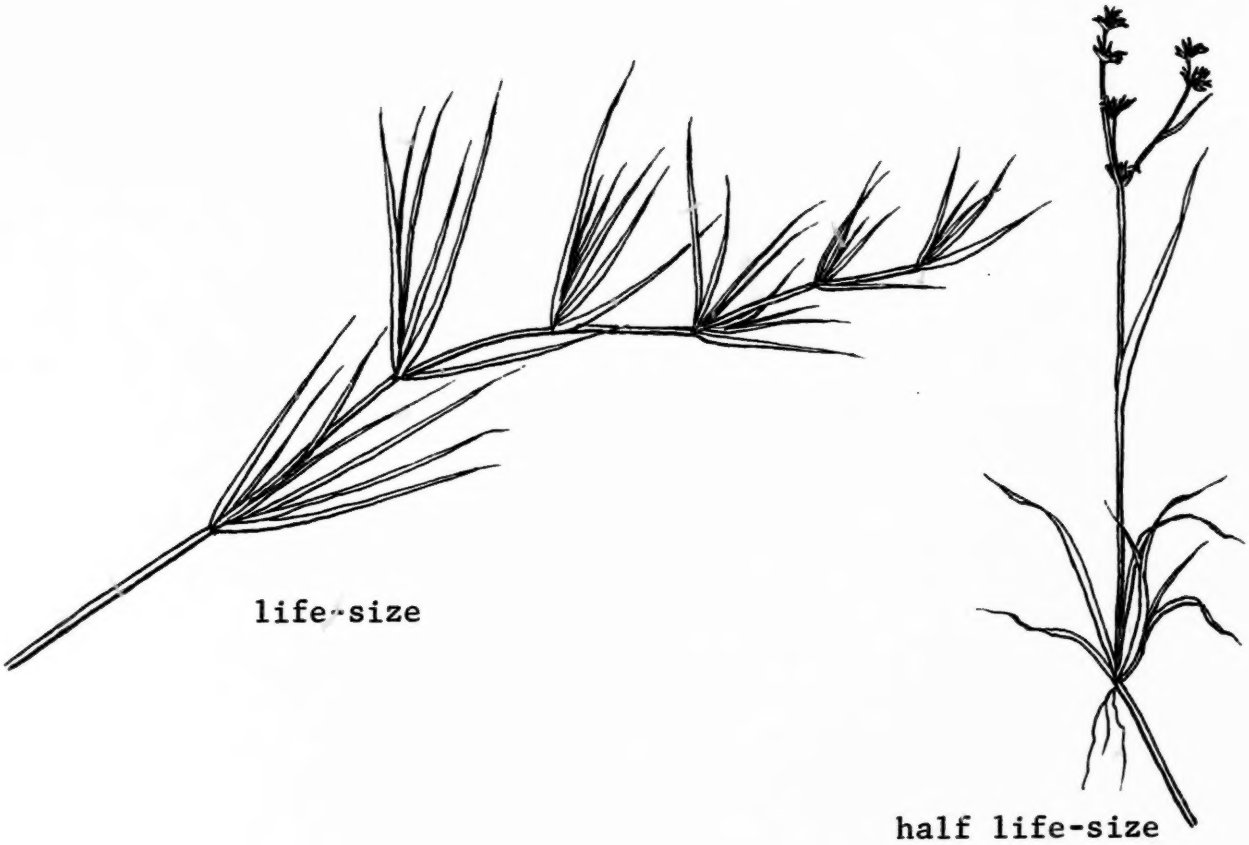
life-size

SOUTH AMERICAN ELODEA, Elodea densa
(Philotria densa)

This common aquarium plant has run wild in fresh inland and rarely coastal water from Oregon to Massachusetts, California, and Florida.

Usually in a branched tangle just under water. Sometimes the 3-petaled flowers whiten a patch of surface.

Small plants resemble big plants of Common Elodea (page 66); but toward the tip of stems the leaves of South American are in fours or fives at a joint, those of Common are in twos and threes.



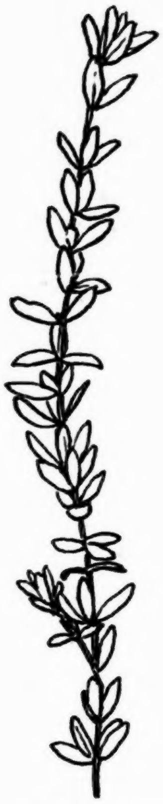
life-size

half life-size

CREEPING RUSH, Juncus repens

Fresh water; Oklahoma to Delaware, Texas, and Florida.

In mats under water, floating, or out of water. Stems are several times as wide as thick. Leaves and clusters of leaves are flat.



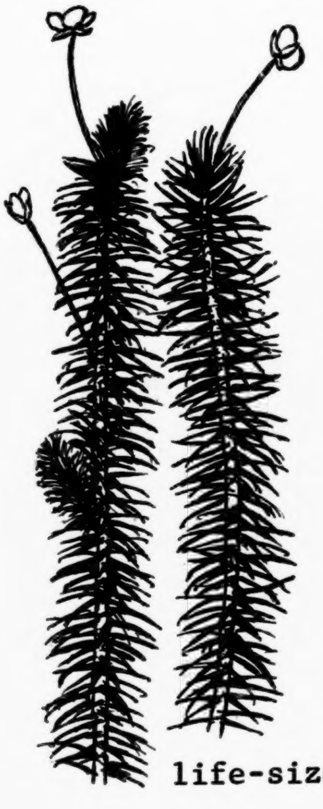
life-size

MICRANTHEMUM, Micranthemum micranthemoides
(Hemianthus glomeratus)

Fresh coastal water from New York to Virginia; and fresh inland and coastal water in Florida.

Grows under water or partly out of water; often under water at high tide. Varies from smaller than pictured to larger and more branched.

Large plants resemble Common Elodea (page 66); but Micranthemum leaves are usually not bunched at the end of branches.



life-size

MAYACA, Mayaca fluviatilis
(Mayaca aubletii)

Fresh water; North Carolina to Texas.

Under water or partly out of water. Has 3-petaled pink flowers.

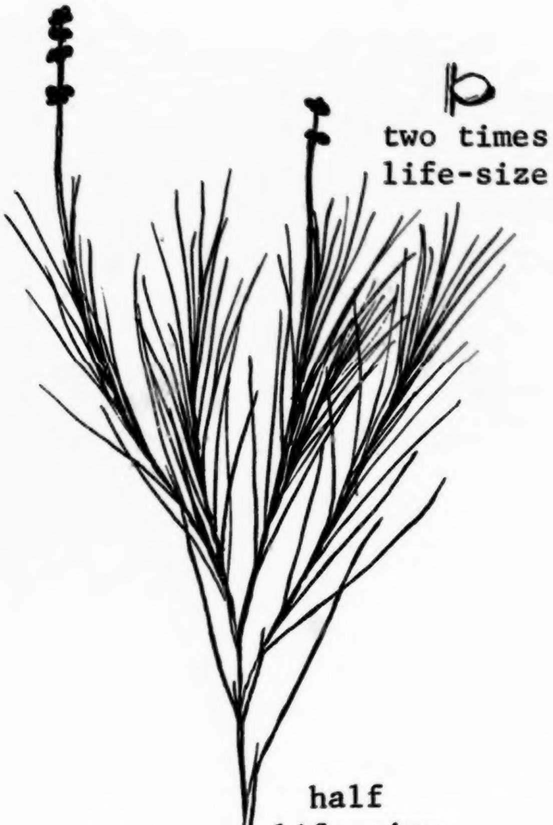
When not in bloom, resembles Bog Clubmoss.

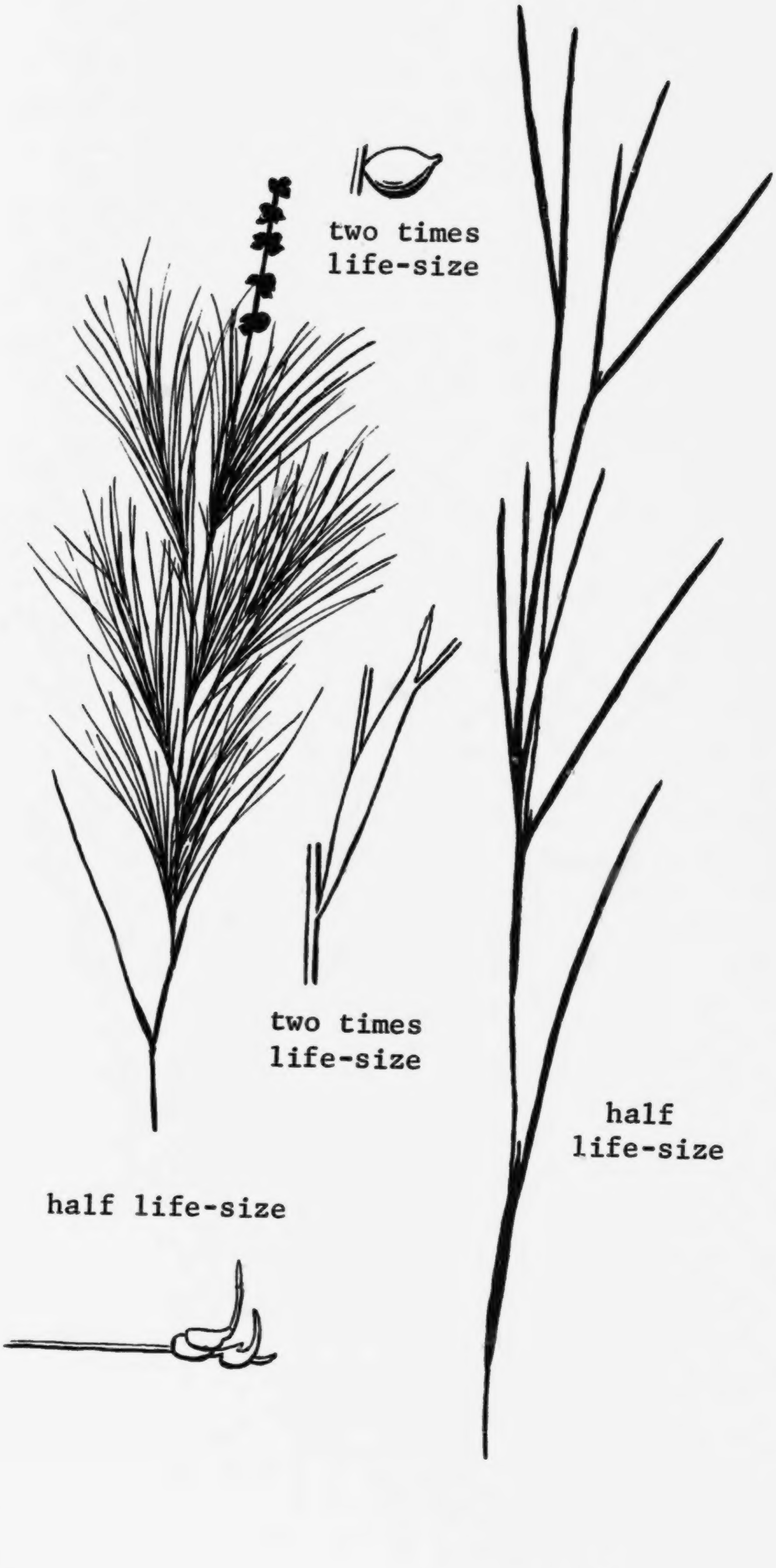
Group 7. PLANTS WITH THREADLIKE TO RIBBONLIKE LEAVES SCATTERED SINGLY ON FLEXIBLE UNDERWATER STEMS, BUT OFTEN PAIRED OR BUNCHED TOWARD THE STEM TIPS; A FEW KINDS ALSO WITH OBLONG TO OVAL FLOATING LEAVES grow in fresh inland water and in fresh to salt coastal water. The stems vary from upright to horizontal and from a few inches long to several feet; and usually they reach almost to the surface of the water, or even trail just beneath or on it. The underwater leaves collapse or partly collapse when taken out of water. In summer, Pondweeds produce small greenish or brownish flowers which are usually close together in oblong or ball-like spikes. In bloom, the upper spikes often stand above water; but when the seeds are ripe, the spikes are usually lying in water. Water-stargrass has scattered yellow flowers and slim seed pods. Widgeongrass has pondweed-like flowers which ripen a small cluster of long-stalked seeds.

THREADLEAF PONDWEED,
Potamogeton filiformis

Fresh inland water and fresh to slightly brackish coastal water; Alaska to Greenland, California, New Mexico, Minnesota, and Pennsylvania.

Resembles Sago Pondweed (page 72); but the stems are usually shorter, and the smaller seeds (a little less than 1/8 inch long) have a flattish, wart-like tip. Resembles Bigsheath Pondweed (page 74); but is smaller, all the leaves have narrow-sheathed bases, and the seed heads usually have only 3 or 4 clusters of seeds.

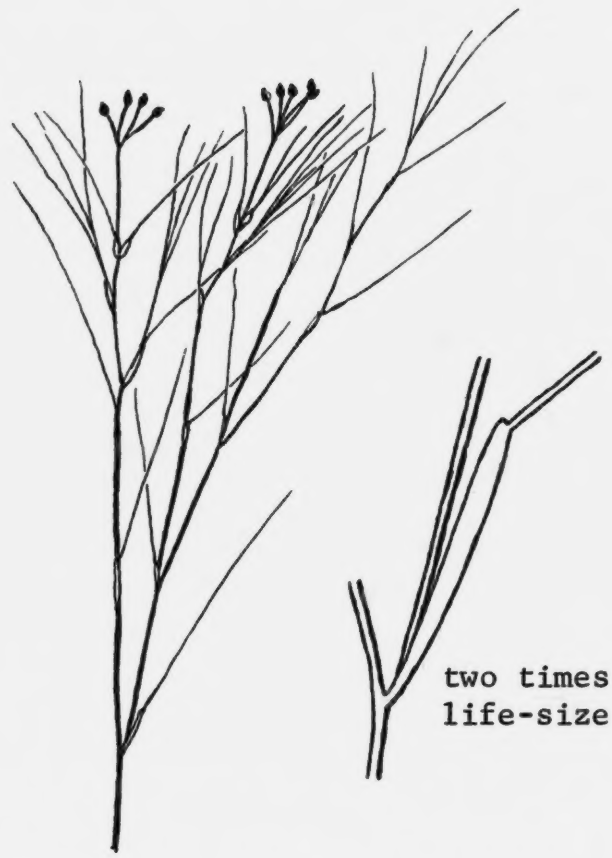




SAGO PONDWEED,
Potamogeton pectinatus

Fresh and alkali inland water and fresh to brackish coastal water; Alaska to Quebec, California, and Florida (but rare in the southeastern states).

Resembles Threadleaf Pondweed (page 71); but the stems are usually longer, and the larger seeds (1/8 inch long or more) have a pointed tip. Resembles Bigsheath Pondweed (page 74); but all the leaves have narrow-sheathed bases, and the seeds have a pointed tip. When not in bloom or seed, resembles non-seeding Widgeongrass (page 73); but the leaves are usually in bushier clusters, the sheathing base of the leaves has a tapering, flimsy tip, and the rootstocks are long and straight and often have tubers.



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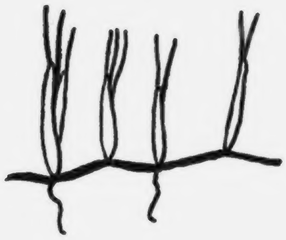
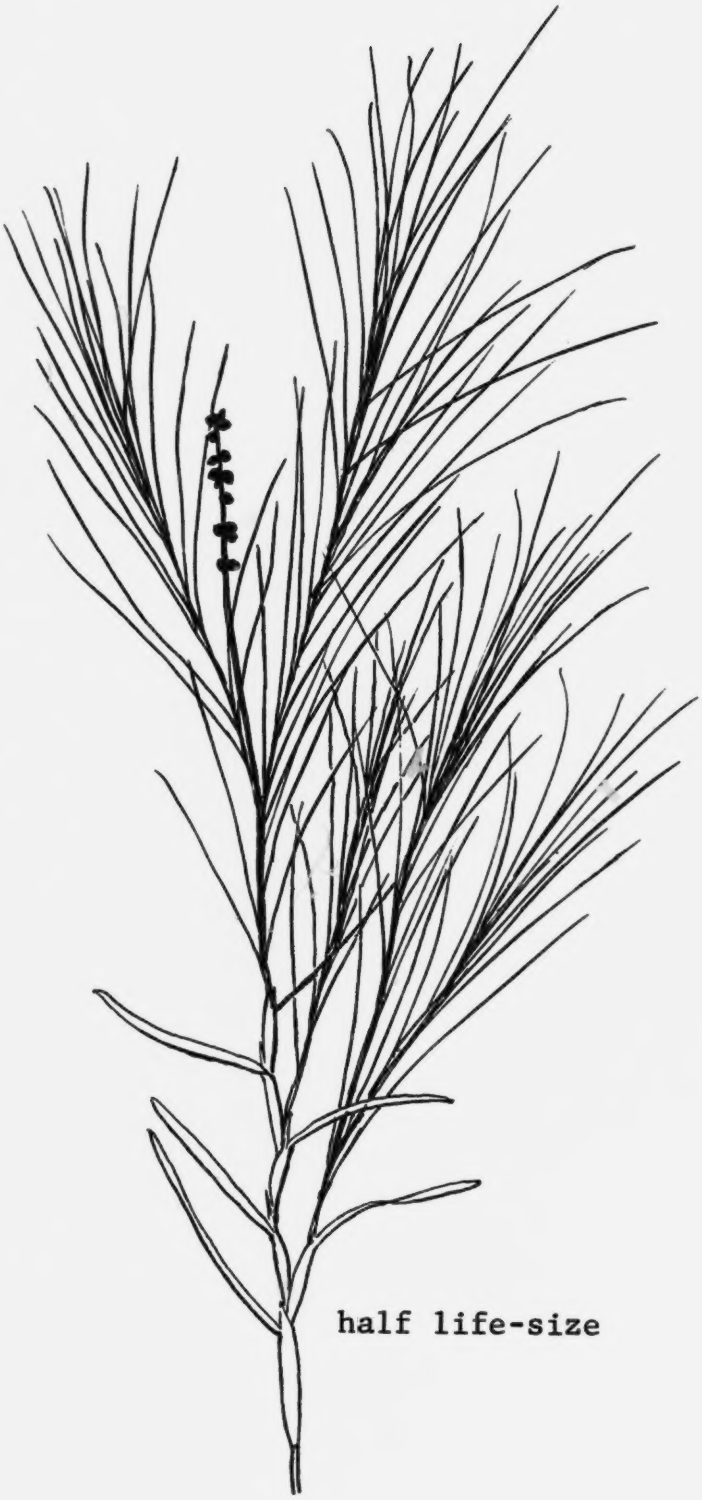


WIDGEONGRASS, Ruppia maritima
(Ruppia occidentalis)

Salt to fresh coastal water and alkali to fresh inland water; Alaska to Newfoundland, California, and Florida (but very rare inland in the eastern half of the continent).

When not in seed, resembles non-seeding Sago Pondweed (page 72); but the leaves are usually in less-bushy clusters, the sheathing base of the leaves has a rounded, firm tip, and the rootstocks are short and zigzag and have no tubers.



BIGSHEATH PONDWEED,
Potamogeton vaginatus

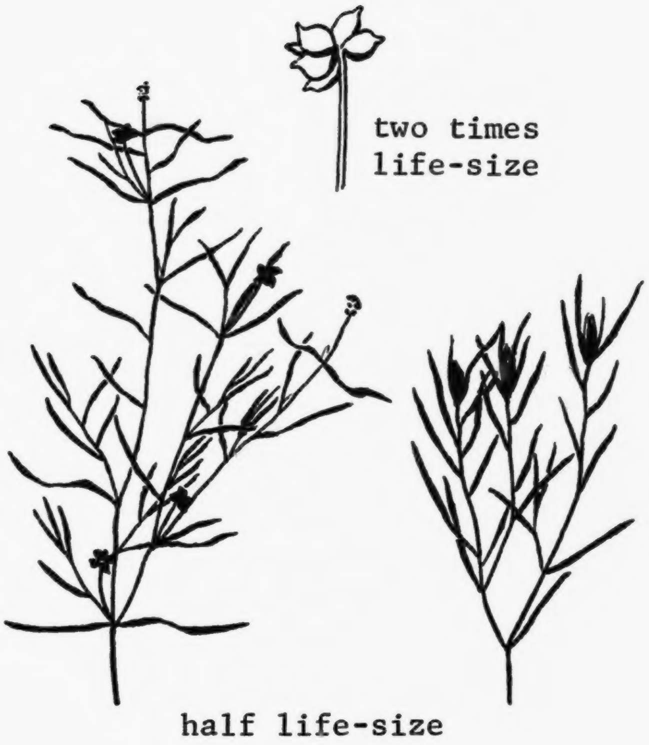
Fresh water; Alaska to Quebec, Oregon, Colorado, and New York.

Resembles Sago Pondweed (page 72); but the sheathing base of the main leaves is two or more times as wide as the stem, and the seeds have a flattish wart-like tip. Resembles Threadleaf Pondweed (page 71); but is bigger, the sheathing base of the main leaves is two or more times as wide as the stem, and the heads usually have 6-10 clusters of seeds.

SLENDER PONDWEED,
Potamogeton pusillus
(Potamogeton berchtoldi,
gemmiparus, and lateralis)

Fresh and alkali inland water and fresh and slightly brackish coastal water; Alaska to Greenland, California, and Florida.

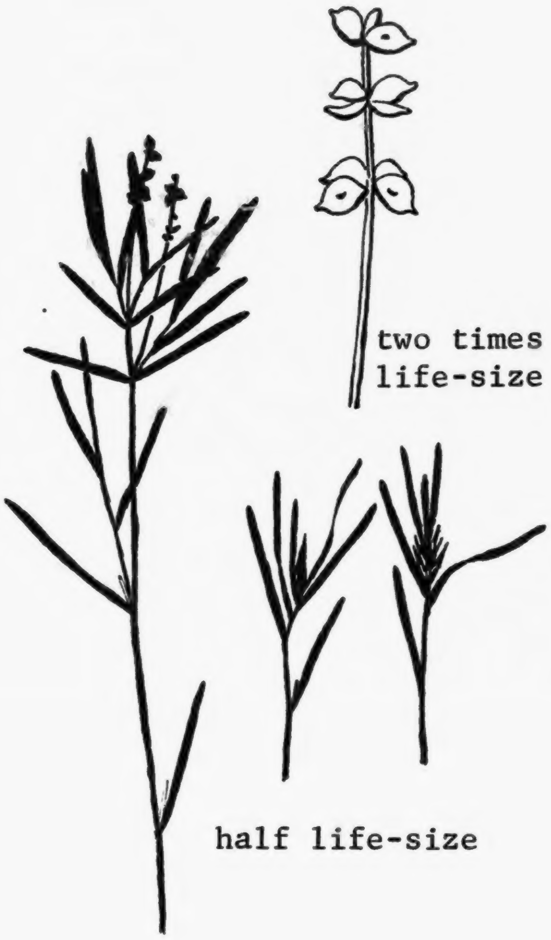
Resembles Leafy Pondweed (page 77); but has longer-stalked seed heads and blunt-backed seeds. Resembles Fries Pondweed (below); but has smaller seeds (a little more than 1/16 inch long) usually smaller leaves, and smaller, smooth-leaved winterbuds. Resembles the underwater form of Snailseed Pondweed (page 78); but has longer-stalked seed heads, convex-sided seeds, and leaves with non-sheathing base. Resembles the underwater form of Vasey Pondweed (page 80); but has bigger, fatter winterbuds.

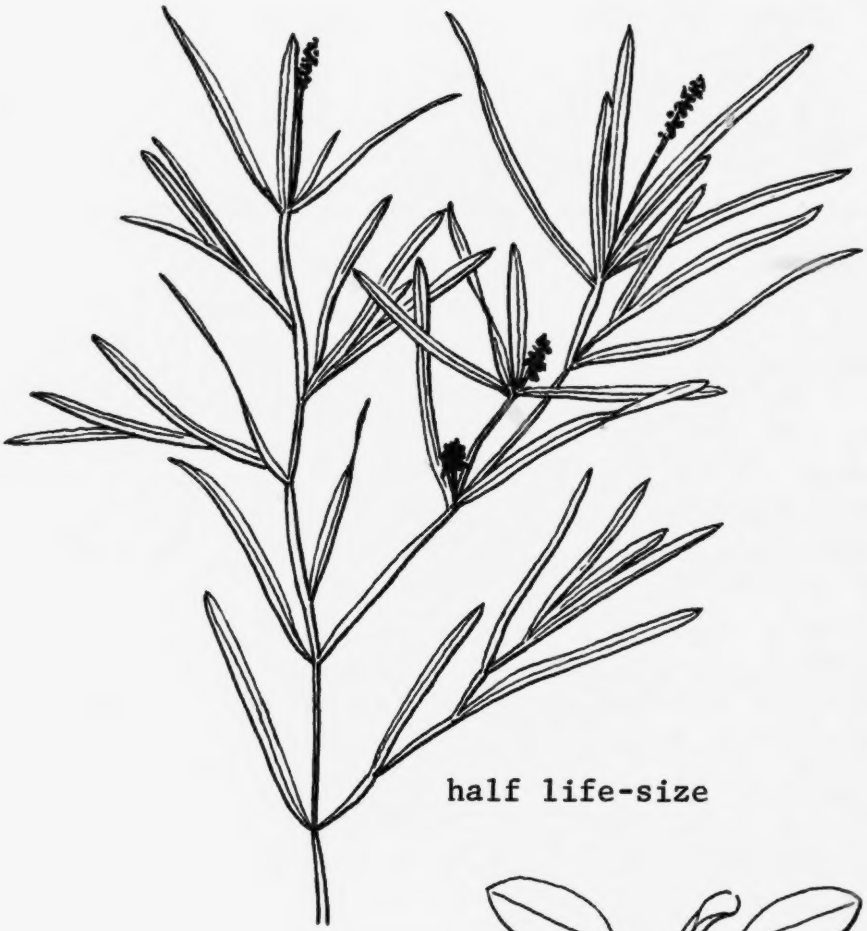


FRIES PONDWEED,
Potamogeton friesii
(Potamogeton longiligulatus
and strictifolius)

Fresh water; Northwest Territories to Newfoundland, Washington, Utah, and Virginia.

Resembles Slender Pondweed (above); but has bigger seeds (nearly 1/8 inch long), usually bigger leaves, and bigger winterbuds with leaves corrugated at the base with raised veins. Resembles Bluntleaf and Leafy Pondweeds (page 77); but has longer-stalked, looser seed heads and blunt-backed seeds.



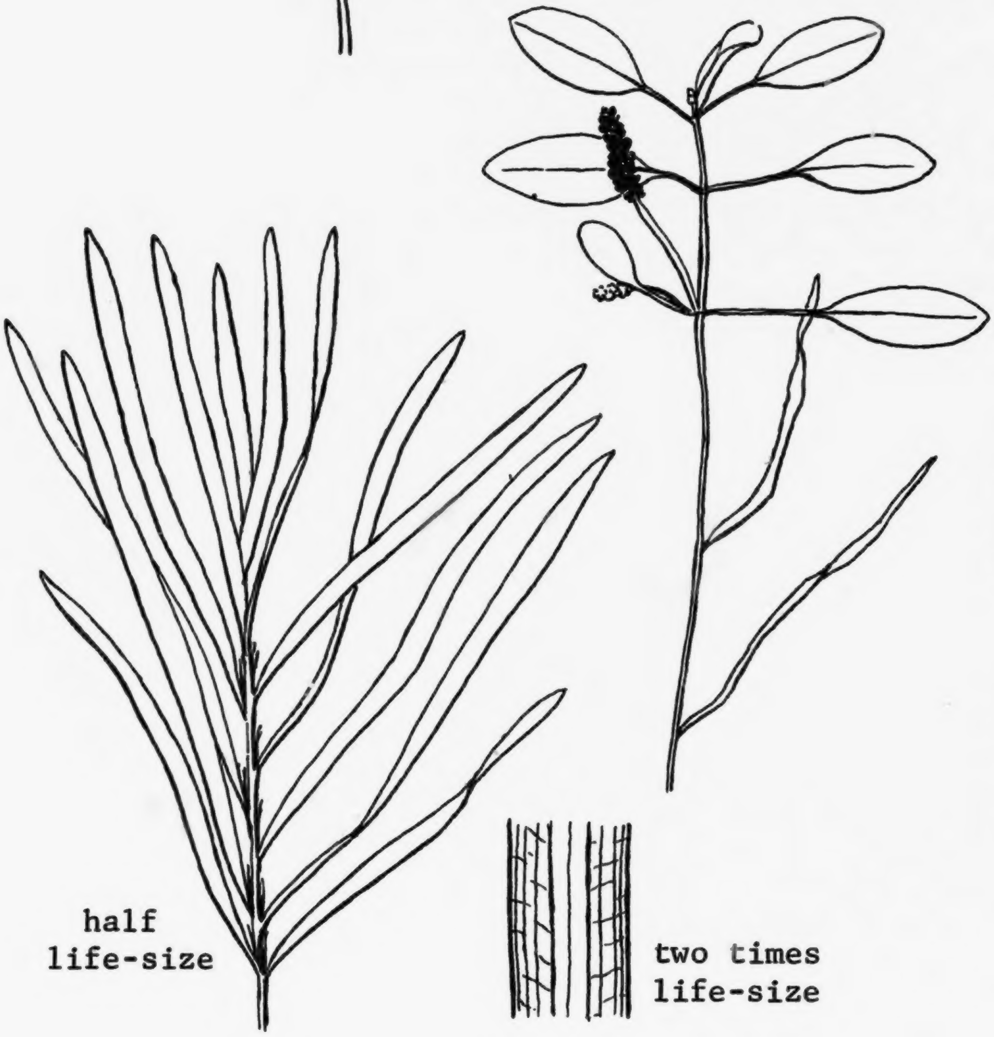


FLATSTEM PONDWEED,
Potamogeton zosteriformis

Fresh water, inland and rarely coastal; Alaska to Quebec, California, Nebraska, and Virginia.

Stems several times as wide as thick.

When not in bloom, resembles non-blooming Water-stargrass (page 79); but has leaves with prominent midvein and non-sheathing base.



RIBBONLEAF PONDWEED,
Potamogeton epihydrus

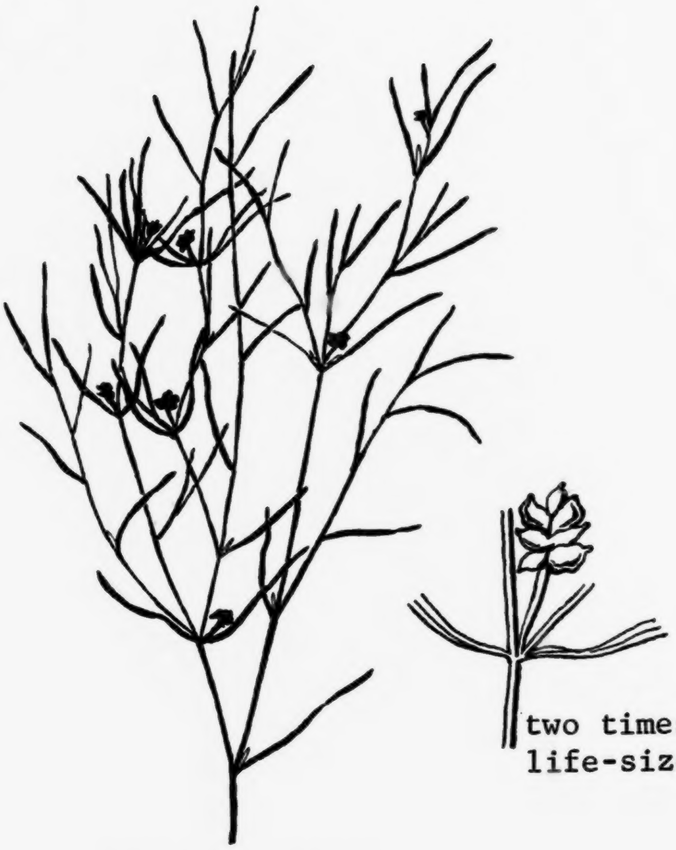
Fresh water, inland, particularly in slow streams, and rarely coastal; Alaska to Quebec, California, Colorado, and Georgia.

The very limp underwater leaves have a light-colored center stripe. Usually there are floating leaves.

LEAFY PONDWEED,
Potamogeton foliosus
(Potamogeton curtissii, fibrillosus, hillii, and porteri)

Fresh and alkali inland water and fresh and slightly brackish coastal water; Northwest Territories to Quebec, California, and Florida.

Resembles Slender and Fries Pondweeds (page 75); but has shorter-stalked seed heads, and seeds with a knife-edge back. Resembles Bluntleaf Pondweed (below); but has sharp-tipped, usually smaller leaves, and ball-like clusters of usually smaller seeds. Resembles the underwater form of Snailseed Pondweed (page 78); but Leafy's leaves do not have a sheathing base, and its seeds are not snail-like. Resembles the underwater form of Vasey Pondweed (page 80); but has bigger, fatter, winterbuds, shorter-stalked seed heads, and seeds with a knife-edge back.



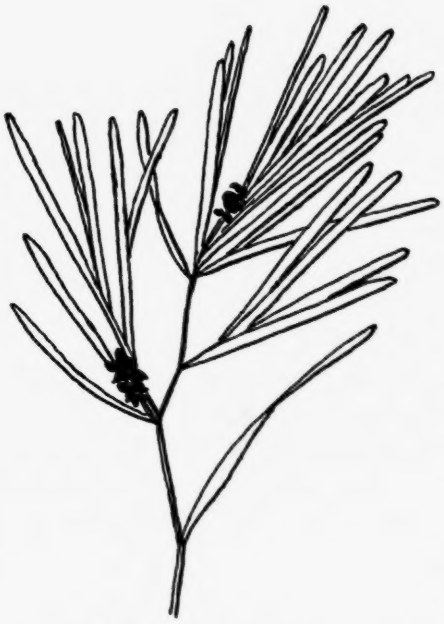
two times life-size

half life-size

BLUNTLEAF PONDWEED,
Potamogeton obtusifolius

Fresh water, often in slow streams; Alaska to Quebec, Wyoming, Michigan, and New Jersey.

Resembles Leafy Pondweed (above); but has round-tipped, usually larger leaves, and oblong clusters of usually larger seeds. Resembles Fries Pondweed (page 75); but has shorter-stalked, denser seed heads, and larger (1/8 inch long or more), sharp-backed seeds.



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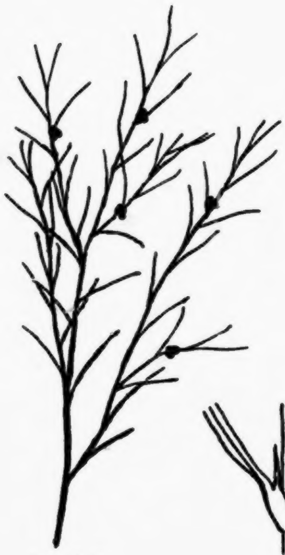
SNAILSEED PONDWEED,

Potamogeton diversifolius
(Potamogeton bicupulatus,
capillaceus, and spirillus)



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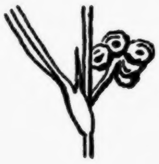

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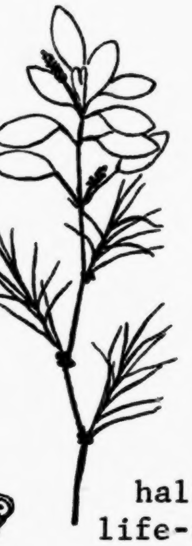

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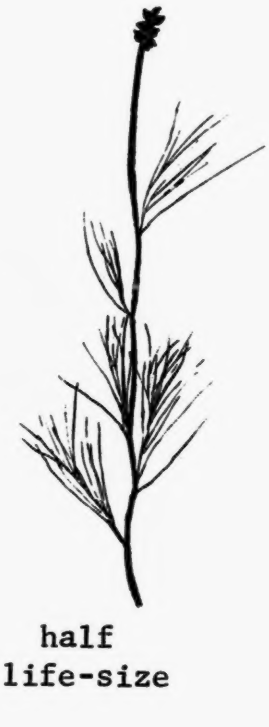
life-size

Fresh water, inland and rarely coastal; Montana to Newfoundland, California, and Florida.

Usually there are floating leaves. Without them, Snailseed Pondweed resembles Slender (page 75), Leafy (page 77), Vasey (page 80), and Alga (below) Pondweeds; but its leaf bases make a sheath around the stem, and it usually has several ball-like, almost stalkless underwater seed heads, with the seeds resembling tiny, flat snails.

ALGA PONDWEED,

Potamogeton confervoides



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life-size

Fresh water; Wisconsin to Newfoundland and New Jersey; and North Carolina.

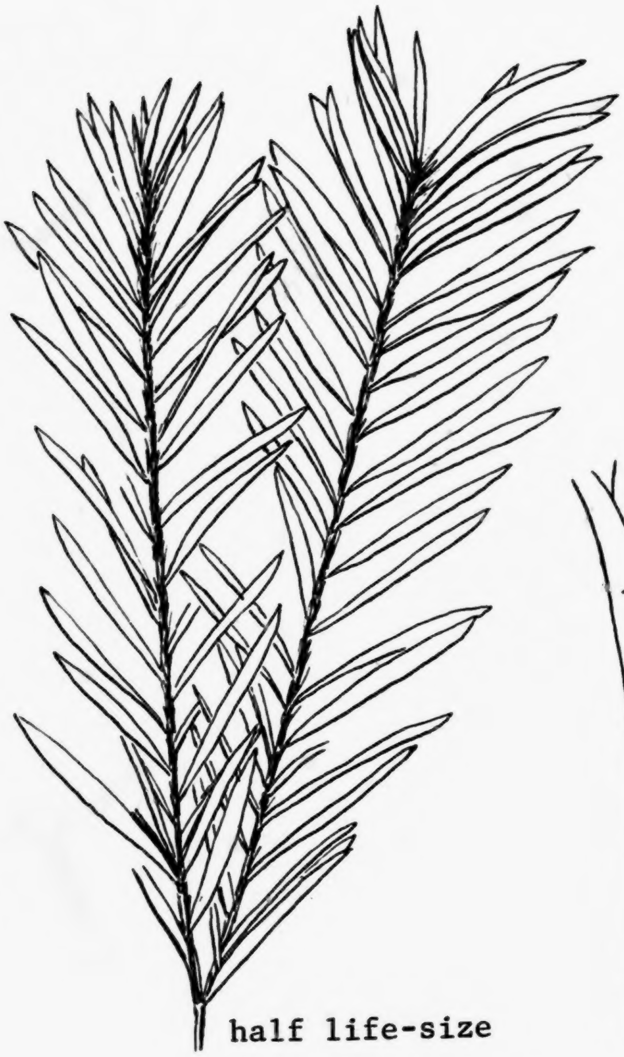
The bunched leaves are flimsy and hairlike.

Without seeds, it resembles the slimmest form of Snailseed Pondweed (above); but its leaves do not have a sheathing base.

FERN PONDWEED, Potamogeton robbinsii

Fresh water, inland and rarely coastal; British Columbia to Wyoming, California, and Utah; Manitoba to Nova Scotia, Minnesota, and Virginia; and Alabama.

Leaf bases make a sheath around the stem. Often these are whitish, overlapping, and frayed into short threads. The form pictured grows in colonies with the tips of stems often a foot or more under water. A longer-stemmed, sprawly form has a less-fernlike look.



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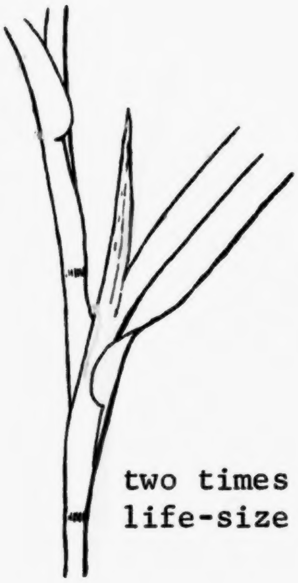


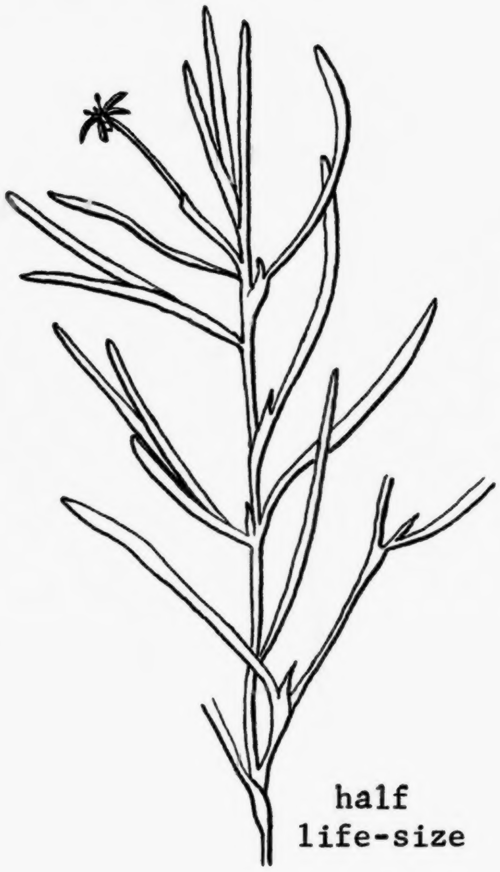
two times life-size

WATER-STARGRASS, Heteranthera dubia (Zosterella dubia)

Fresh water, inland and rarely coastal; Washington to Quebec, California, and Florida (but rare from the Rockies west).

Yellow flowers are followed by slim pods with tiny seeds. Short plants sprawling on wet mud grow and bloom as well as longer ones do in water.

When not in bloom, resembles non-blooming Flatstem Pondweed (page 76); but has leaves without a noticeable midvein and with a base that makes a sheath around the stem.



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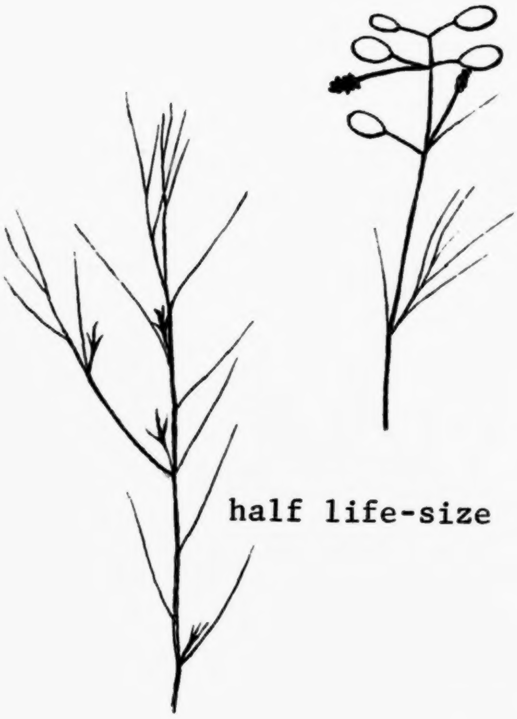

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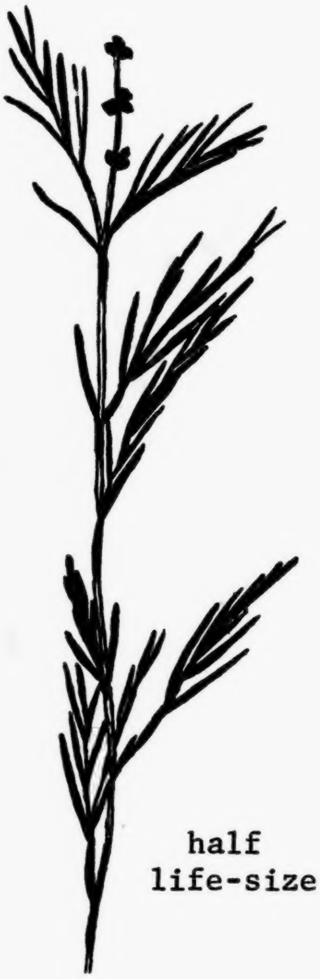
VASEY PONDWEED, Potamogeton vaseyi

Fresh water; Minnesota to New Brunswick, Iowa, and Pennsylvania.

Leaves hairlike and with long-tapered tips. Often there are tiny winterbuds on short stalks at the base of leaves. Sometimes there are floating leaves.

When without floating leaves, Vasey Pondweed resembles the slimmest form of Slender Pondweed (page 75); but it has smaller, slimmer winterbuds.



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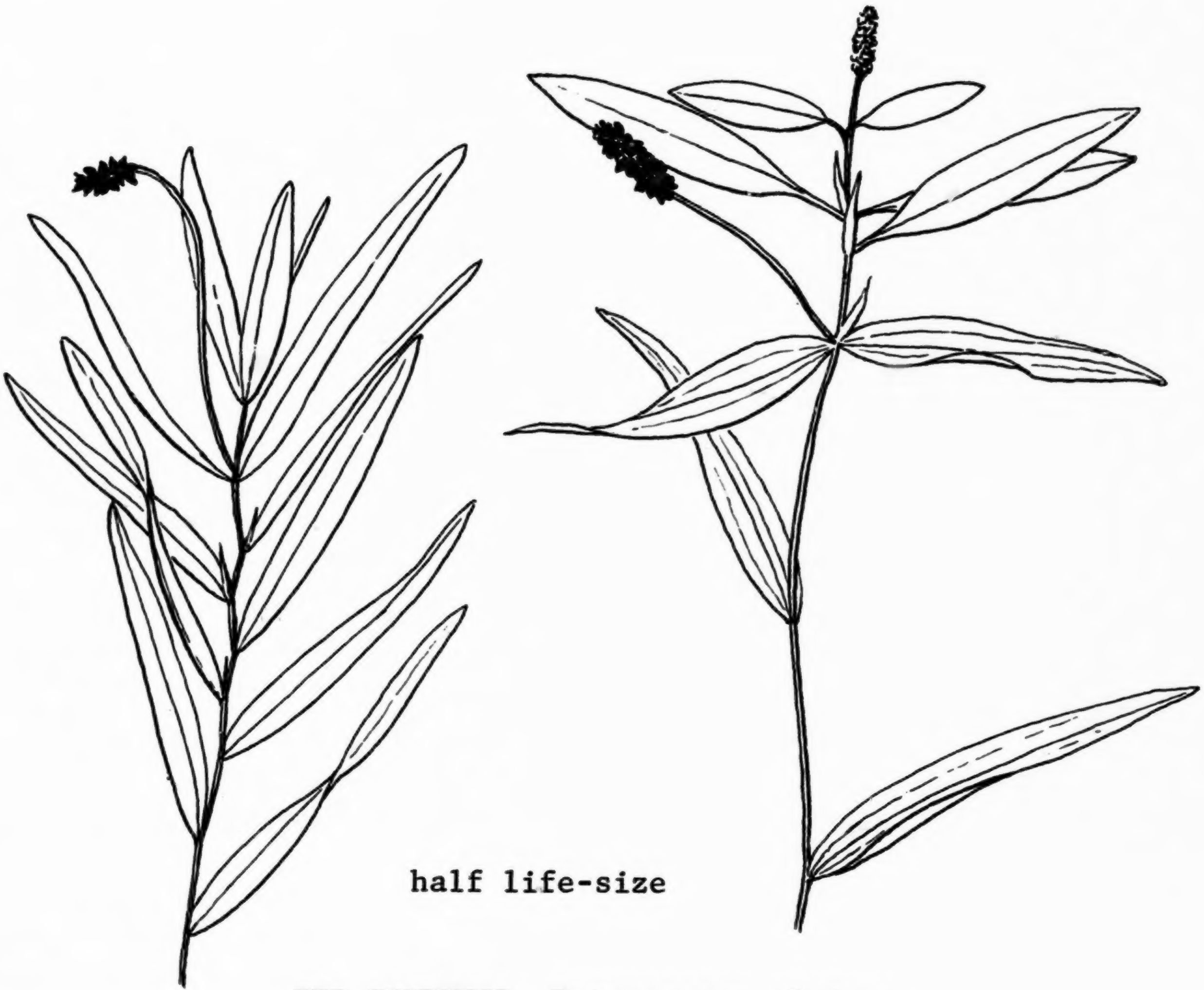
life-size

WESTERN PONDWEED,
Potamogeton latifolius

Alkali water; Oregon to California and Texas.

The short, ribbonlike, blunt-tipped leaves have a base which makes a sheath two or more times the width of the stem. Seed heads and seeds resemble those of Sago Pondweed (page 72).

Group 8. PLANTS WITH LANCE-SHAPED TO OVAL LEAVES SCATTERED SINGLY ON FLEXIBLE UNDERWATER STEMS, BUT OFTEN PAIRED OR BUNCHED TOWARD THE STEM TIPS; SOME KINDS ALSO WITH OBLONG TO OVAL FLOATING LEAVES grow in fresh inland water and in fresh to brackish coastal water. The stems vary from upright to horizontal; frequently are several feet long; and are usually branched. Usually they reach almost to the surface of the water; and Red, Variable, and Bigleaf Pondweed stems are often tipped with floating leaves. In summer, these Pondweeds produce small greenish or brownish flowers which are close together in oblong spikes. In bloom, the spikes often stand above water; but when the seeds are ripe the spikes are usually lying in water.



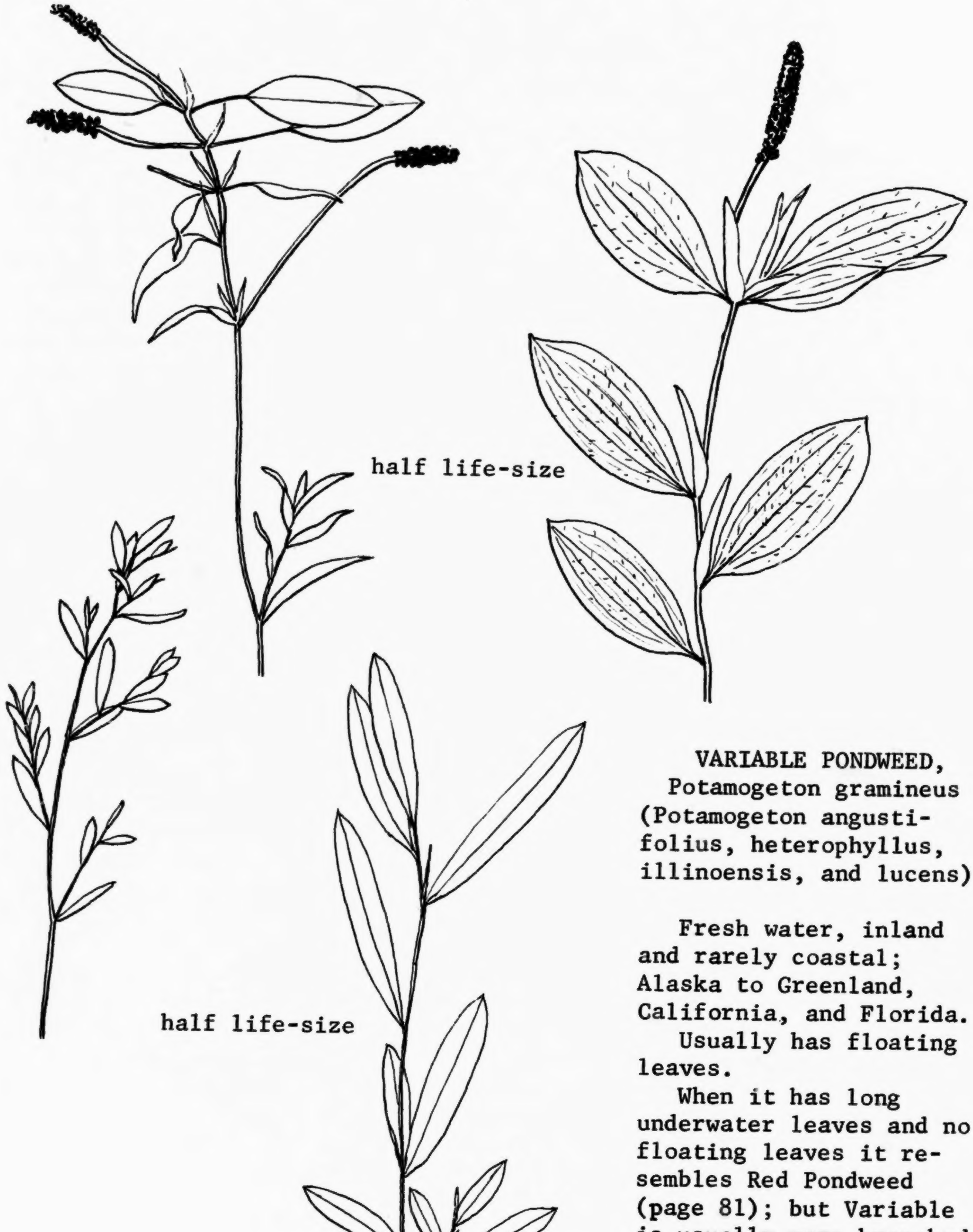
half life-size

RED PONDWEED, Potamogeton alpinus

Fresh water, often in slow streams; Alaska to Greenland, California, Colorado, Wisconsin, and Pennsylvania.

Plants are usually reddish. Sometimes they have floating leaves.

Resembles plants of Variable Pondweed (page 82) with long underwater leaves and no floating leaves; but Red Pondweed is usually only a little branched.

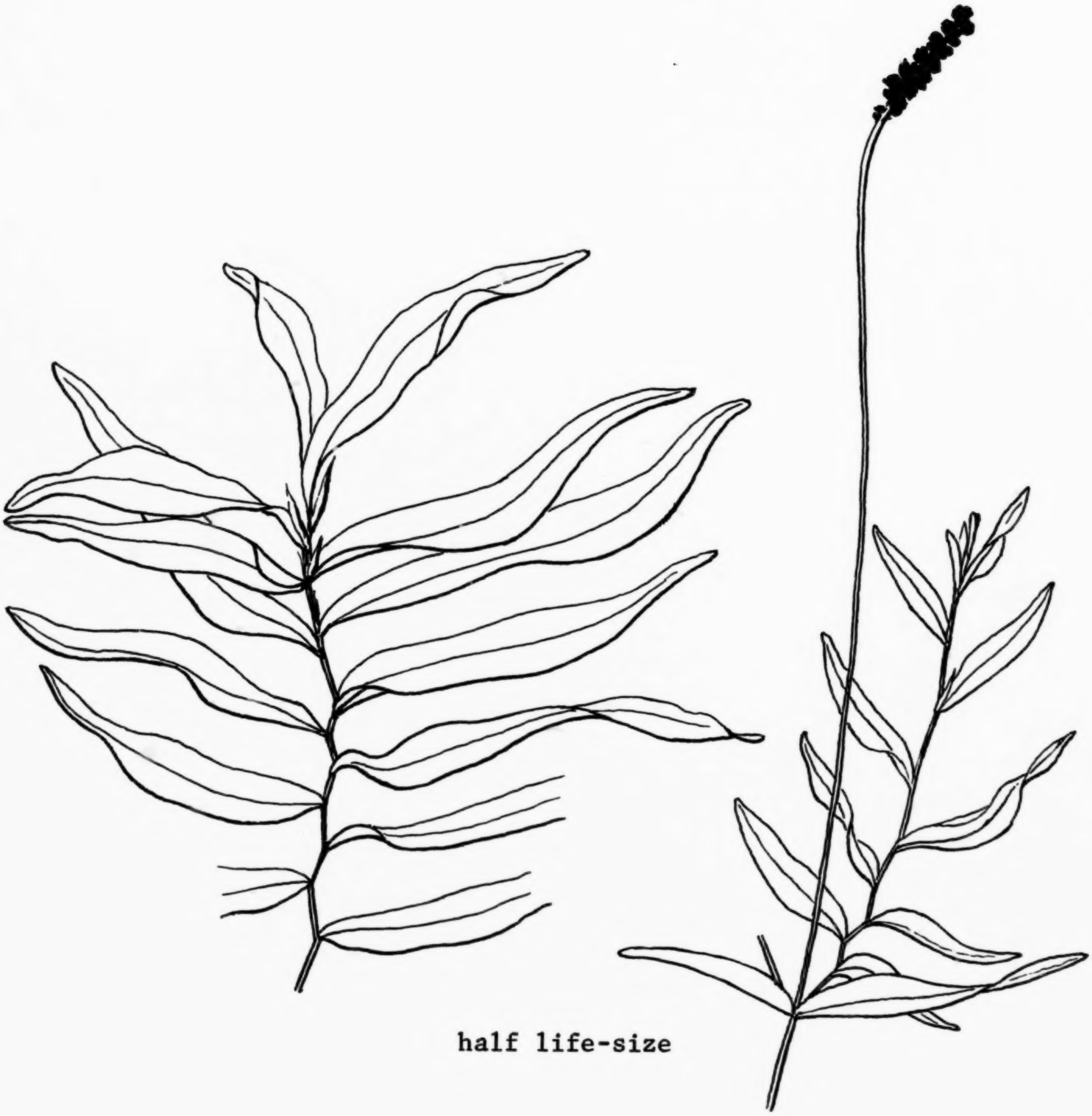


VARIABLE PONDWEED,
Potamogeton gramineus
(Potamogeton angustifolius, heterophyllus, illinoensis, and lucens)

Fresh water, inland and rarely coastal; Alaska to Greenland, California, and Florida.

Usually has floating leaves.

When it has long underwater leaves and no floating leaves it resembles Red Pondweed (page 81); but Variable is usually more branched. Large plants resemble Longleaf Pondweed (page 92); but Variable has short-stalked or stalkless underwater leaves which are not long-tapered at the tip.



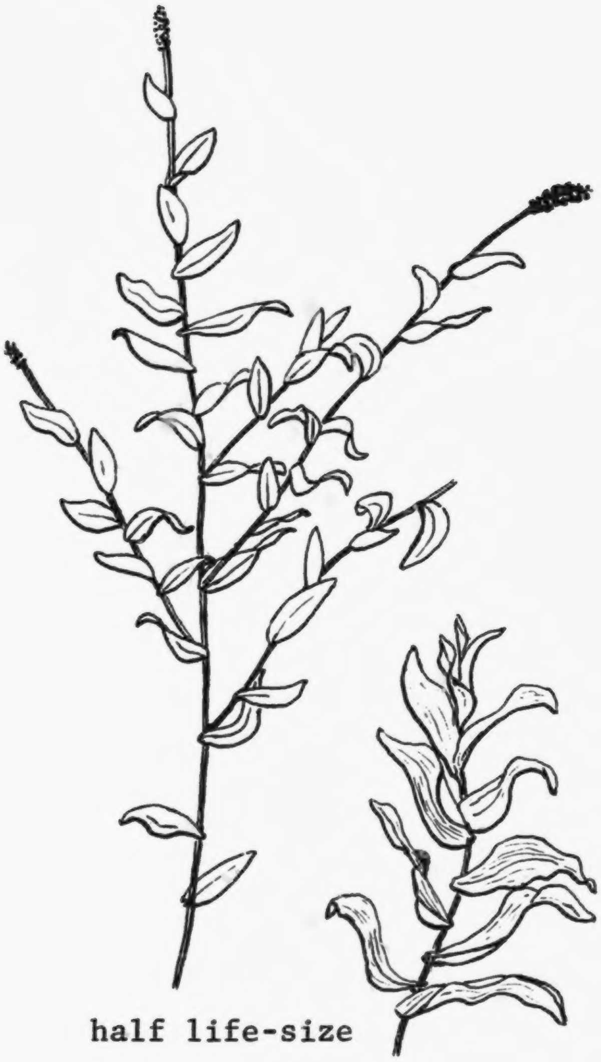
half life-size

WHITESTEM PONDWEED, Potamogeton praelongus

Fresh water; Alaska to Newfoundland, California, Colorado, and New Jersey.

Leaves sometimes puckered.

Resembles long-leaved plants of Redhead-grass (page 84); but Whitestem's leaves have a hooded tip which splits a little way back when it is flattened, the upper part of stems is usually zigzag, the seed heads are long-stalked, and the sharp-backed seeds are about 3/16 inch long.



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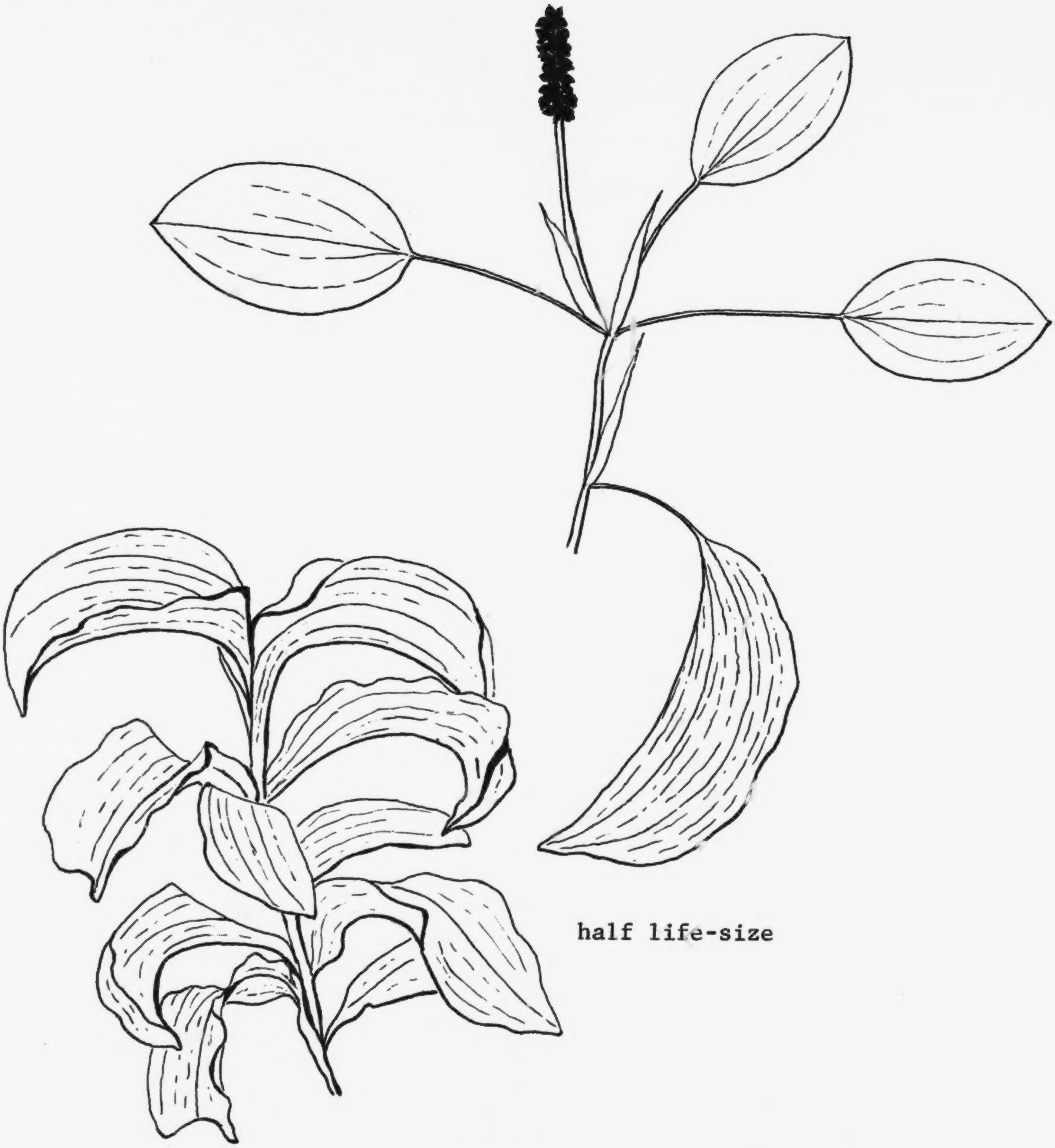
REDHEAD-GRASS, Potamogeton perfoliatus
(Potamogeton richardsonii)

Fresh inland water; Alaska to Newfoundland, California, Arizona, Nebraska, and New Jersey. And fresh to brackish coastal water; Newfoundland to Texas (but rare south of North Carolina).

Leaves vary from oval and flat to lance-shaped and puckered.

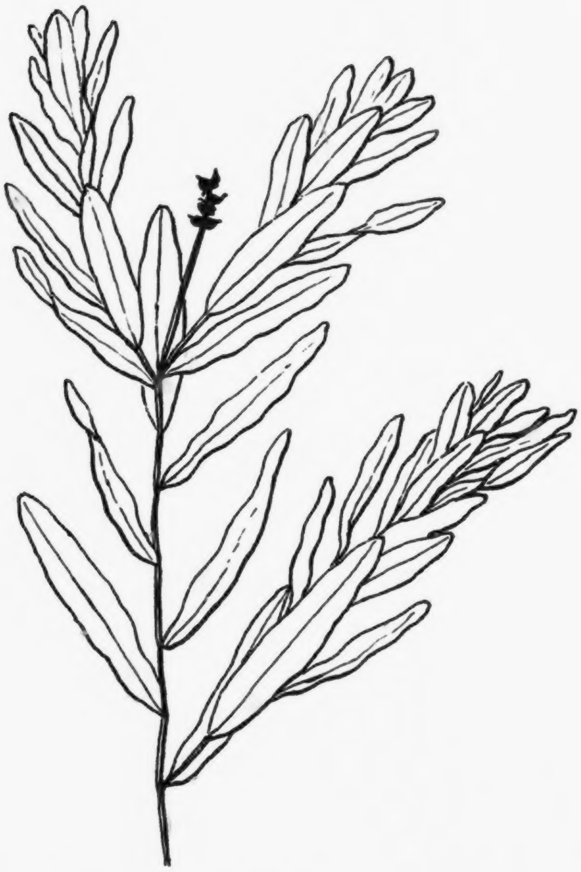
Long-leaved plants resemble Whitestem Pondweed (page 83); but the leaves have a flat tip, the upper part of stems is usually straight, the seed heads are short-stalked, and the blunt-backed seeds are about 1/8 inch long.



BIGLEAF PONDWEED, Potamogeton amplifolius

Fresh water, inland and rarely coastal; British Columbia to Newfoundland, California, Oklahoma, and Georgia (but rare in the Rockies and Great Basin).

Underwater leaves are usually strongly-arched lengthwise. Usually there are floating leaves.



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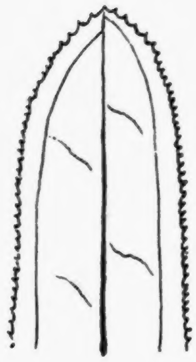


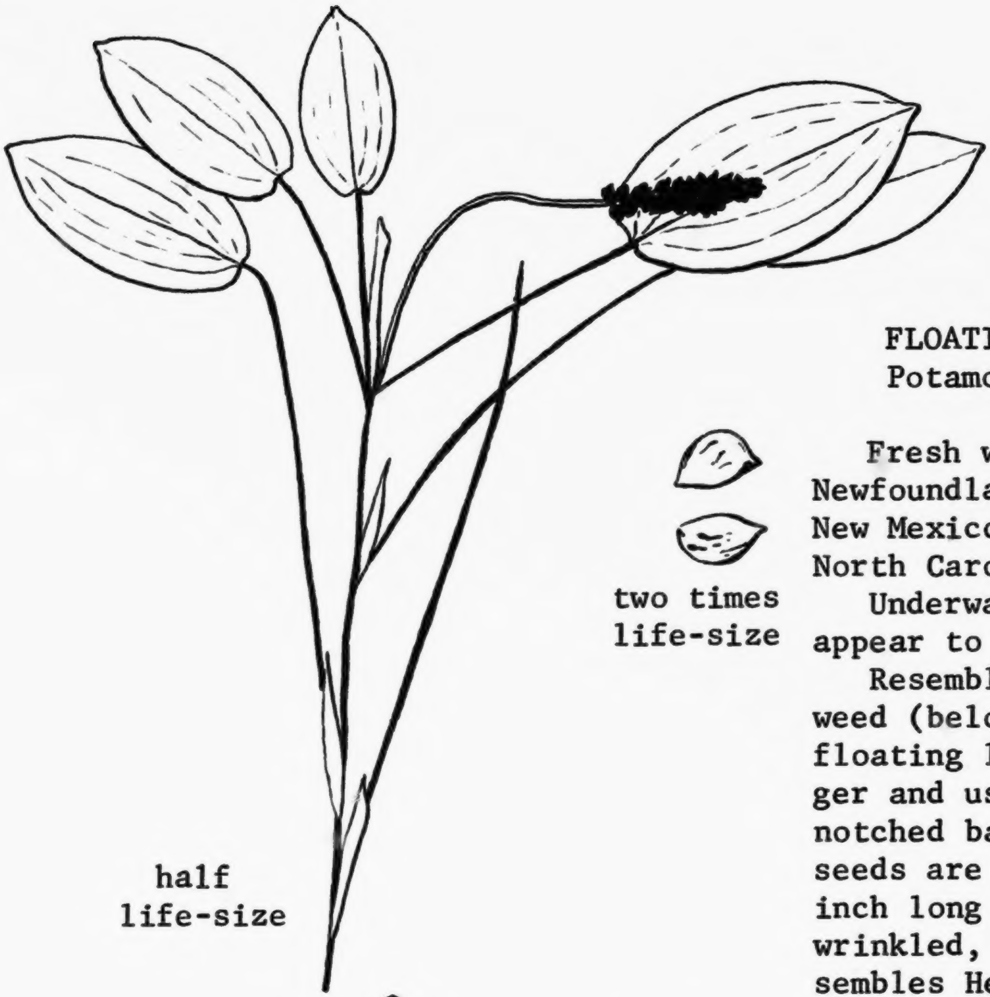
two times
life-size

CURLY PONDWEED, Potamogeton crispus

Fresh inland water and fresh to slightly brackish coastal water; Alberta to Quebec, California, and Florida. This native of the Old World has been in North America for at least 150 years and is still spreading.

Leaves have finely-toothed, usually puckered edges.

Group 9. PLANTS WITH LANCE-SHAPED TO ROUND FLOATING LEAVES WHICH ARE TAPERED TO SLIGHTLY NOTCHED AT THE BASE; SOME KINDS ALSO WITH THREADLIKE TO OVAL UNDERWATER LEAVES; AND SOME KINDS ALSO GROWING PARTLY OUT OF WATER grow in fresh inland water and in fresh coastal water. The leaves of some kinds are on flexible, upright to horizontal stems; others have leaves in clumps on the bottom or coming up from rootstocks. Flowers vary from the inconspicuous ones of Pondweeds to the showy yellowish ones of American Lotus.

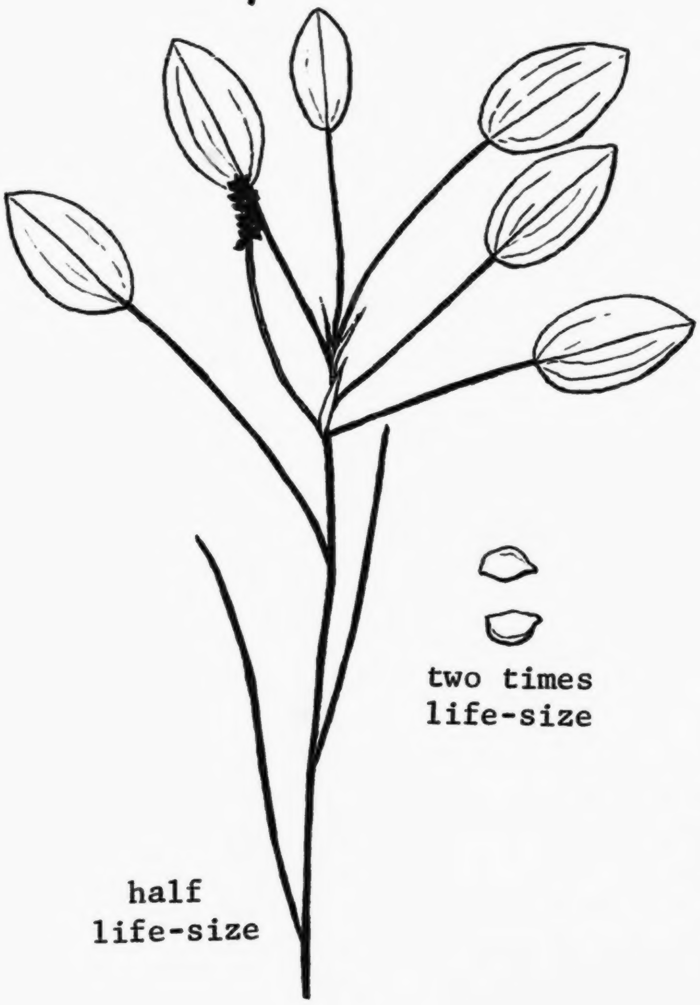


FLOATING PONDWEED,
Potamogeton natans

Fresh water; Alaska to Newfoundland, California, New Mexico, Illinois, and North Carolina.

Underwater leaves appear to be mere stalks.

Resembles Oakes Pondweed (below); but the floating leaves are bigger and usually have a notched base, and the seeds are more than 1/8 inch long and have a wrinkled, shiny skin. Resembles Heartleaf Pondweed (page 94); but the floating leaves are usually widest about half way from the base to the tip, there are no widened underwater leaves, and the seeds are shiny and are blunt on the back.

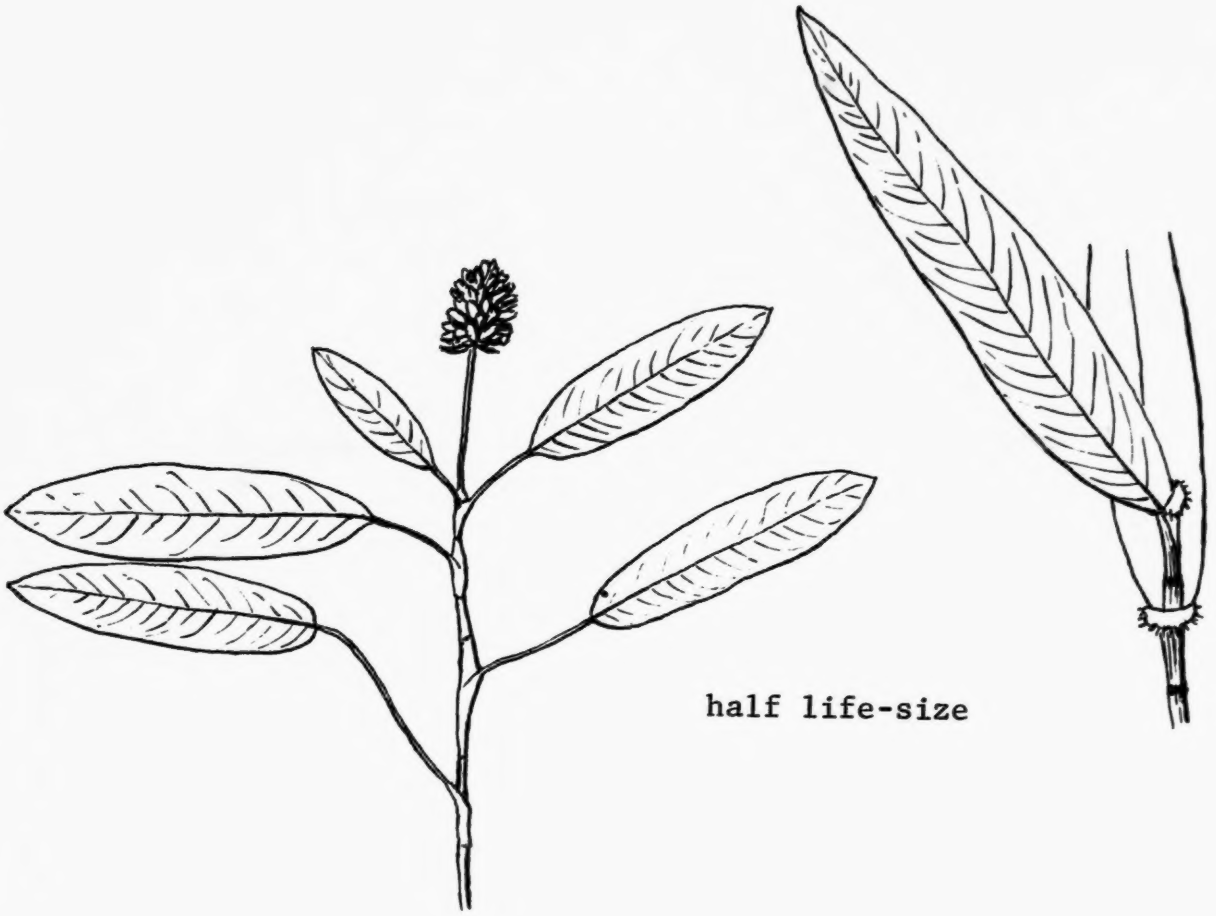


OAKES PONDWEED,
Potamogeton oakesianus

Fresh water; Ontario to Newfoundland, Wisconsin, and Virginia.

Underwater leaves appear to be mere stalks.

Resembles Floating Pondweed (above); but the floating leaves are smaller and have a rounded or tapering base, and the seeds are about 1/8 inch long and have a tight, dull skin.

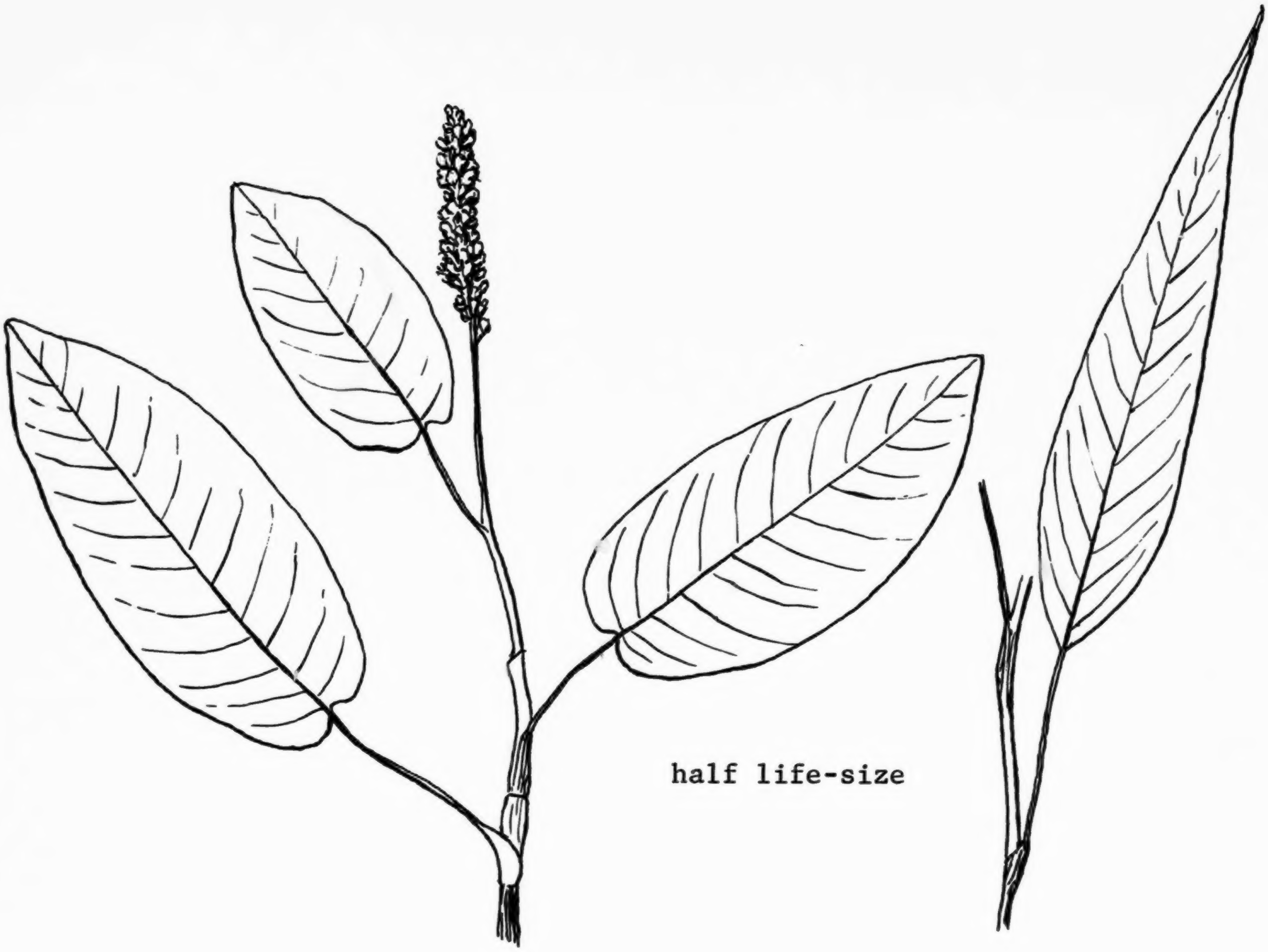


WATER SMARTWEED, Polygonum amphibium
(Polygonum natans)

Fresh water; Alaska to Quebec, California, Illinois, and New Jersey.

Heads of pink flowers stand above water. An upright form grows in wet soil or reaches high above shallow water.

Resembles Marsh Smartweed (page 90); but the shorter clusters of flowers are on hairless stalks, and the leaves are smaller and narrower.



MARSH SMARTWEED, Polygonum coccineum
(Persicaria muhlenbergii)

Fresh water; British Columbia to Quebec, California, Texas, and South Carolina.

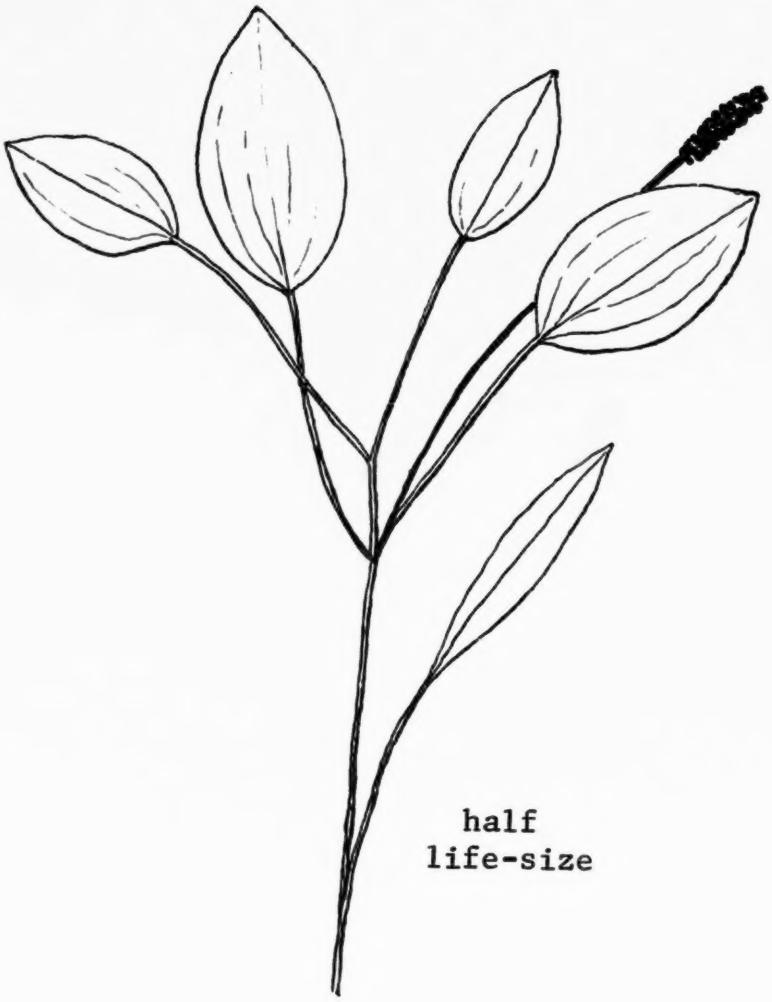
Heads of pink flowers stand above water. A commoner, upright form grows in wet soil or reaches high above shallow water.

Resembles Water Smartweed (page 89); but the longer clusters of flowers are on fine-hairy stalks, and the leaves are bigger and wider.

BOG PONDWEED,
Potamogeton oblongus

Fresh water; Newfoundland to Nova Scotia.

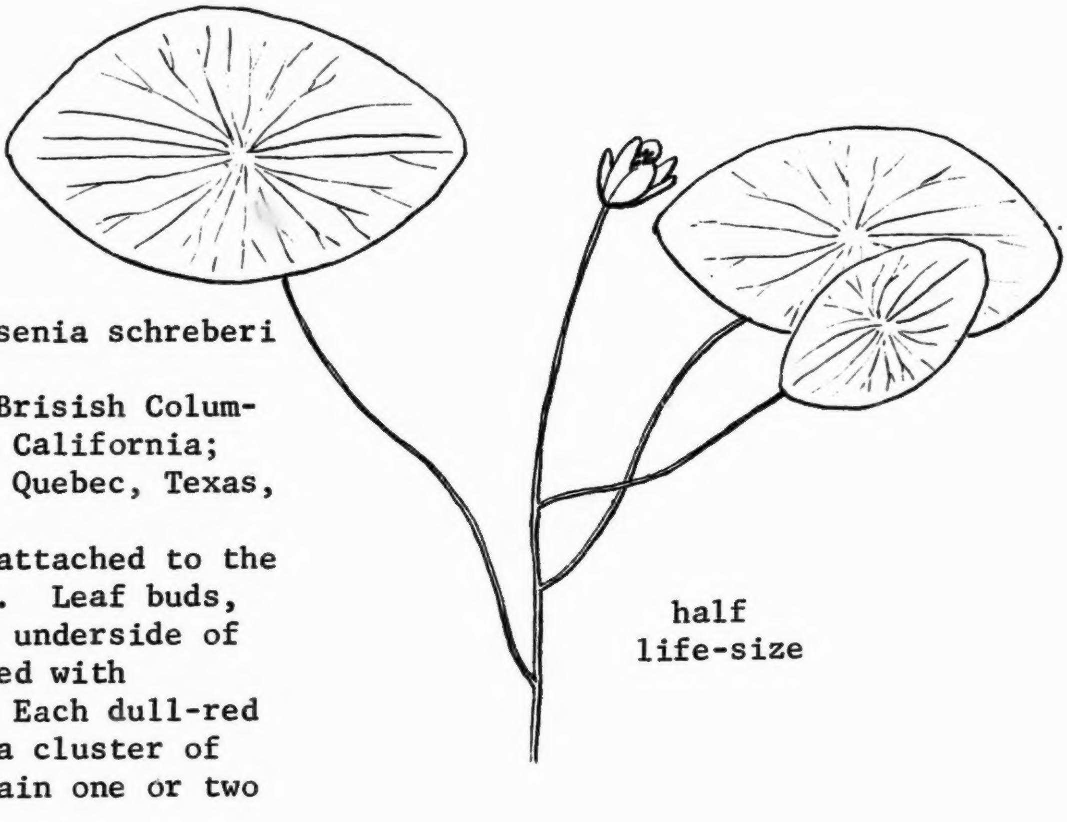
Seeds are red, nearly round in side view, and a little more than 1/16 inch long.


half life-size

WATERSHIELD, Brasenia schreberi

Fresh water; Brisish Columbia to Idaho and California; and Minnesota to Quebec, Texas, and Florida.

The stalk is attached to the middle of a leaf. Leaf buds, flower buds, and underside of leaves are covered with slippery jelly. Each dull-red flower produces a cluster of pods which contain one or two seeds apiece.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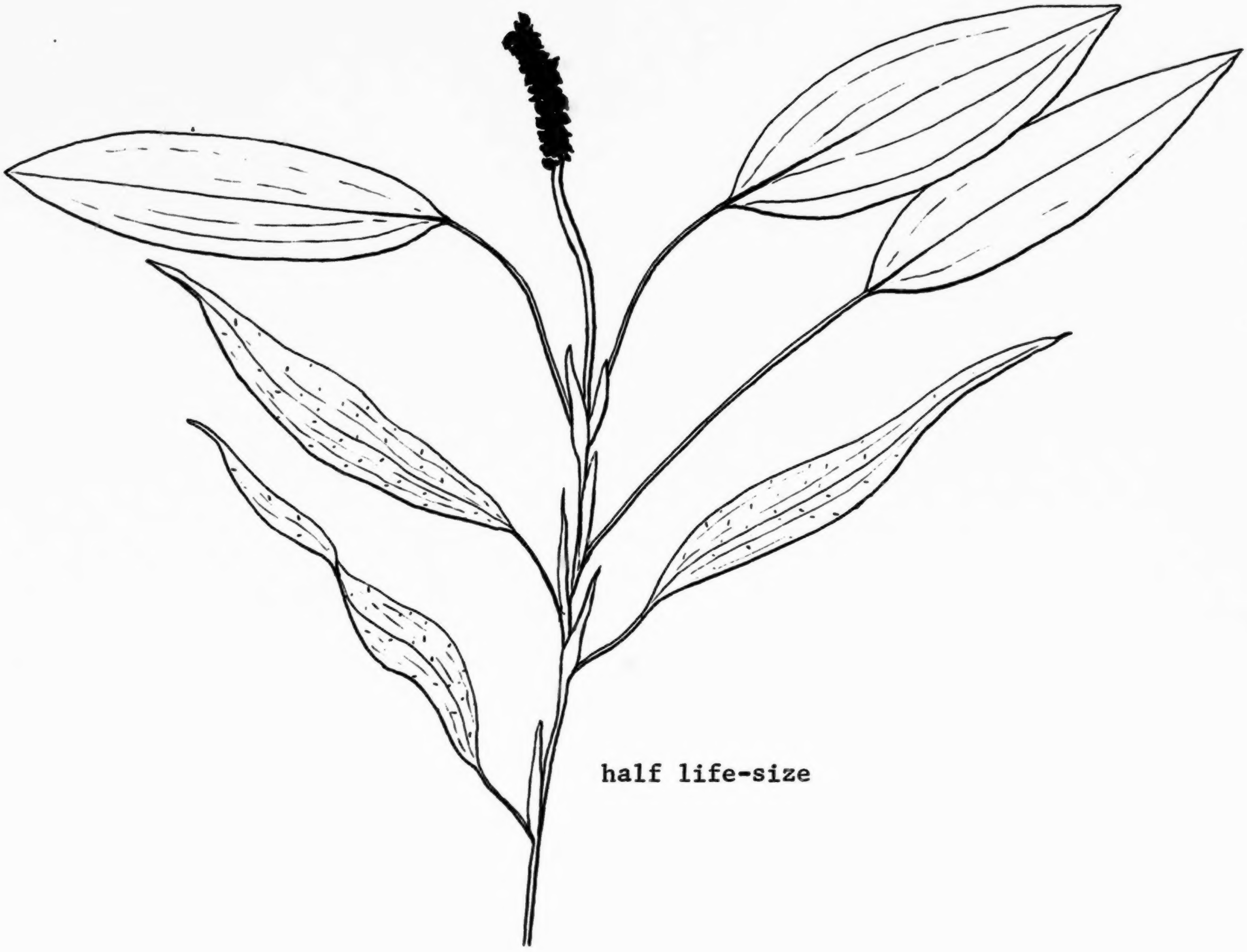


LONGLEAF PONDWEED, Potamogeton nodosus
(Potamogeton fluitans)

Fresh, often flowing water, inland and rarely coastal; British Columbia to New Brunswick, California, and Florida.

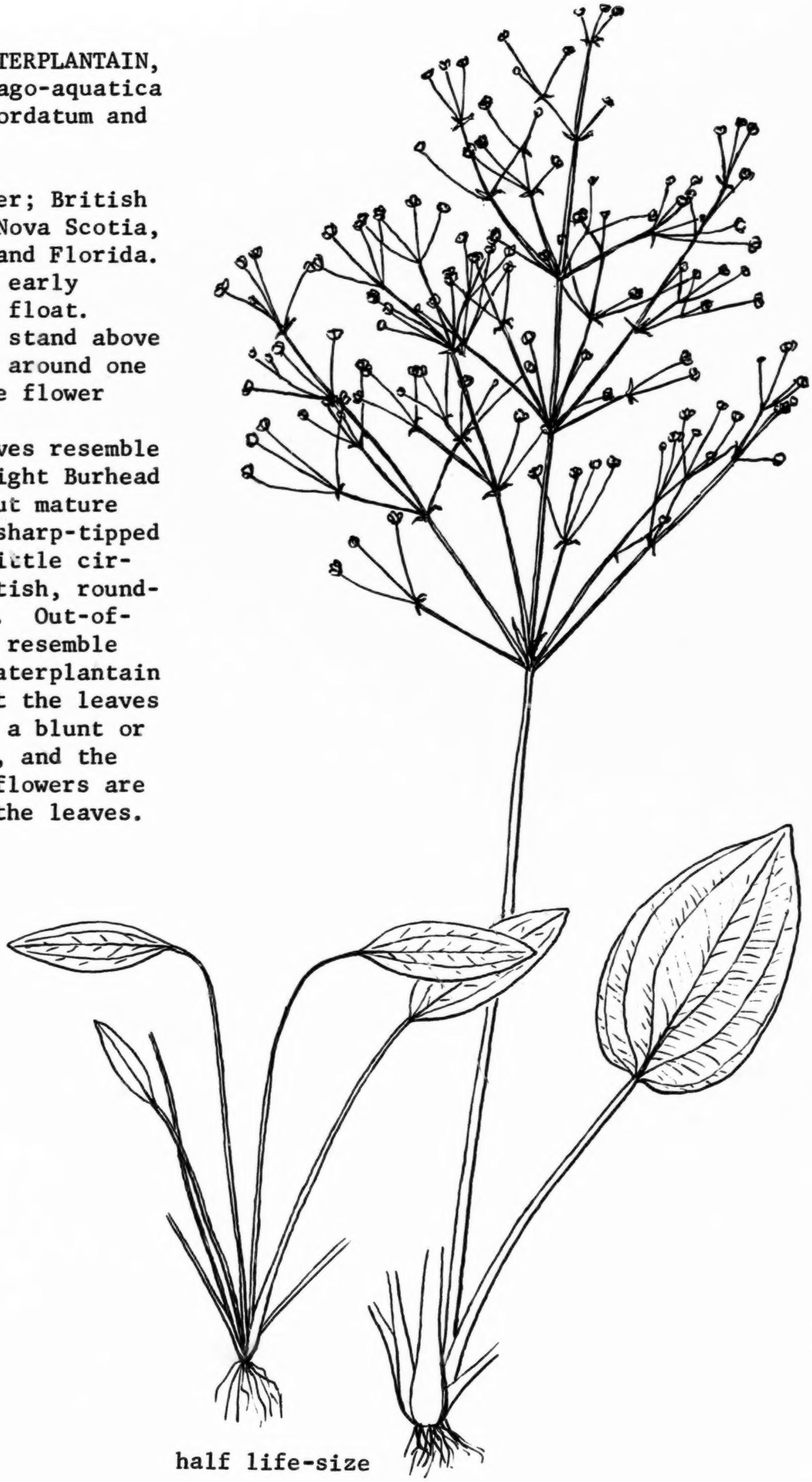
Resembles large plants of Variable Pondweed (page 82); but Longleaf has long-stalked underwater leaves which are long-tapered at the tip.

BROADLEAF WATERPLANTAIN,
Alisma plantago-aquatica
(*Alisma subcordatum* and
triviale)

Fresh water; British Columbia to Nova Scotia, California, and Florida.

Clustered early leaves often float. Later leaves stand above water or mud around one or more loose flower heads.

Early leaves resemble those of Upright Burhead (page 96); but mature plants have sharp-tipped leaves and little circles of flattish, round-tipped seeds. Out-of-water plants resemble Narrowleaf Waterplantain (page 9); but the leaves usually have a blunt or notched base, and the clusters of flowers are longer than the leaves.



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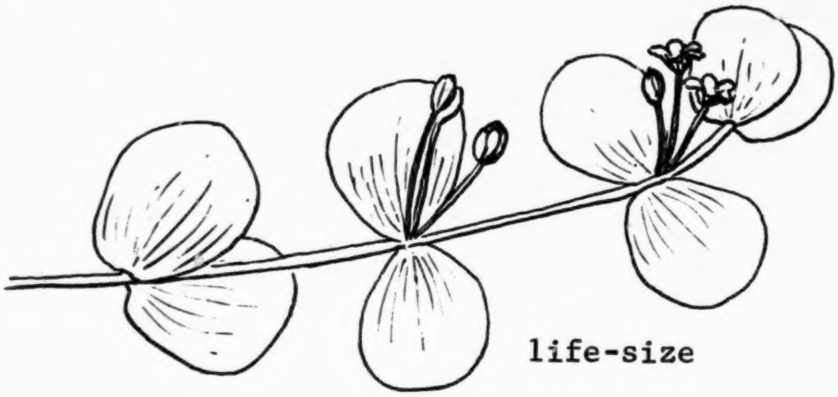
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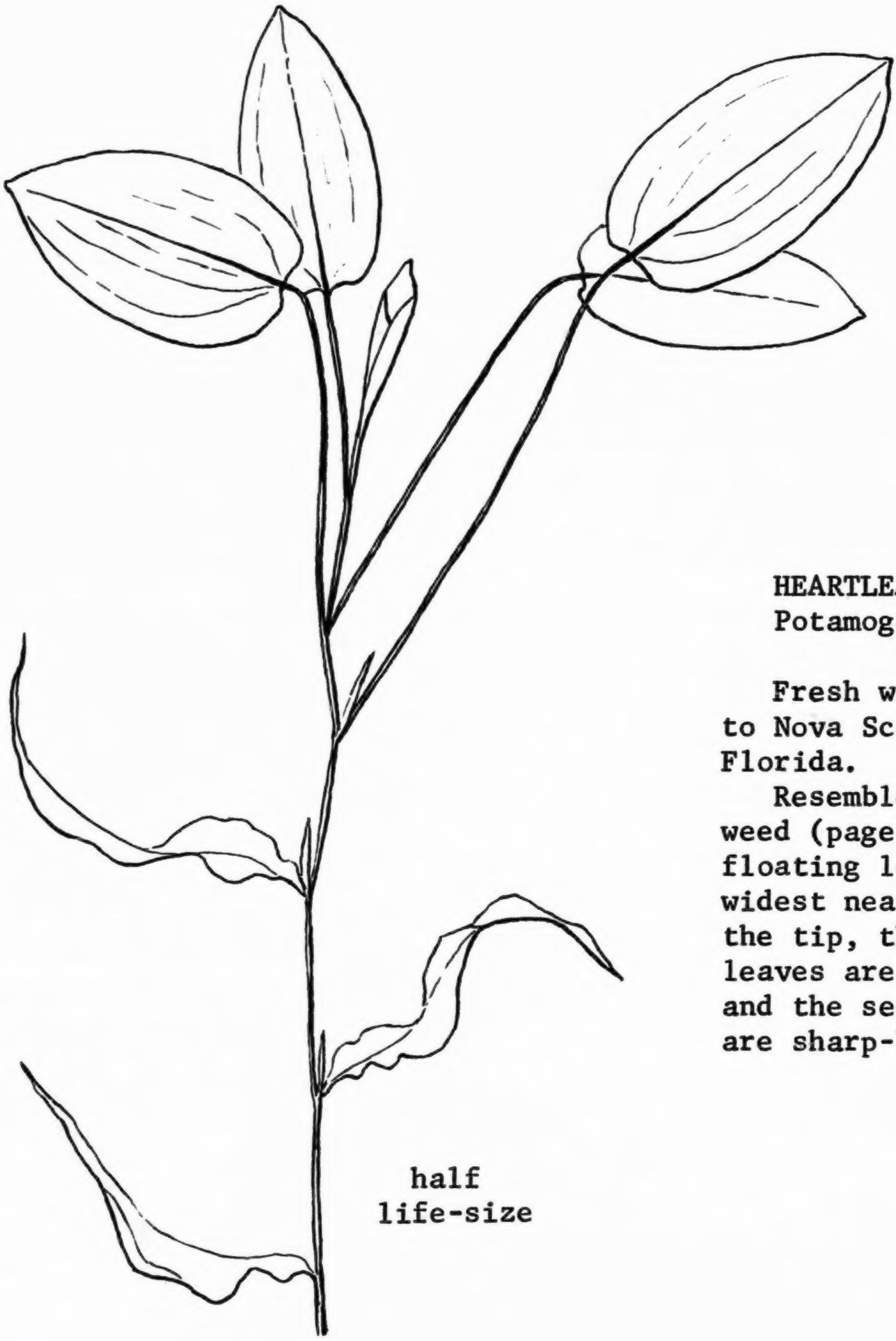
ROUNDLEAF BACOPA,
Bacopa rotundifolia
(Bacopa eisenii and nobsiana; Macuillamia rotundifolia)

Fresh water; British Columbia to Manitoba, California, Louisiana, and North Carolina.
Flowers are white.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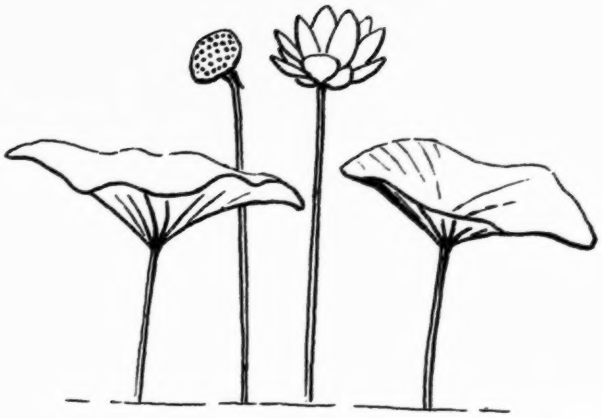
life-size

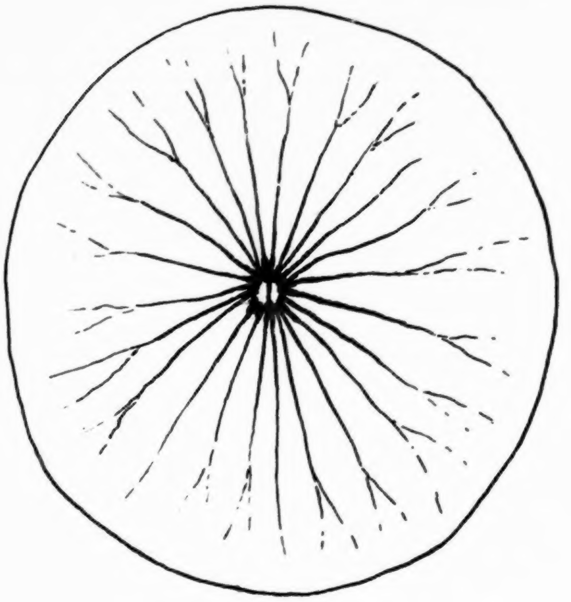
HEARTLEAF PONDWEED,
Potamogeton pulcher

Fresh water; Minnesota to Nova Scotia, Texas, and Florida.

Resembles Floating Pondweed (page 88); but the floating leaves are usually widest nearer the base than the tip, the underwater leaves are lance-shaped, and the seeds are dull and are sharp-backed.



sixteenth life-size



quarter life-size

AMERICAN LOTUS, Nelumbo lutea

Fresh water, inland and rarely coastal; Minnesota to Massachusetts, Texas, and Florida.

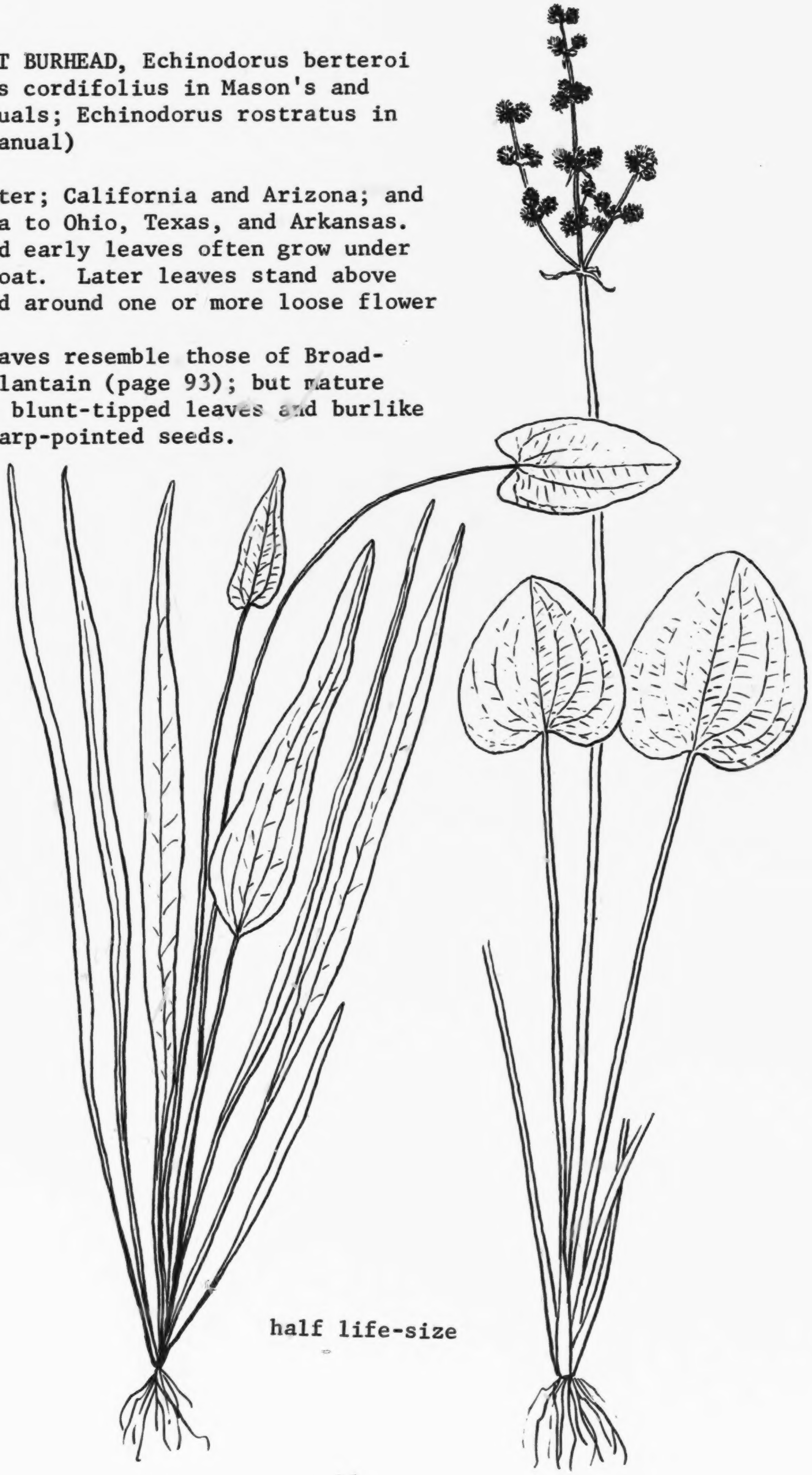
Grayish-green leaves which are as much as 2 feet across float or stand above water. When standing, they often look like partly-wrongside-out umbrellas. The pale-yellow fragrant flowers are as much as 10 inches across. The acornlike seeds are in individual pits in a flat-topped receptacle. When not quite ripe, they taste like chestnuts.

UPRIGHT BURHEAD, Echinodorus berteroi (Echinodorus cordifolius in Mason's and Small's manuals; Echinodorus rostratus in Fernald's manual)

Fresh water; California and Arizona; and South Dakota to Ohio, Texas, and Arkansas.

Clustered early leaves often grow under water or float. Later leaves stand above water or mud around one or more loose flower heads.

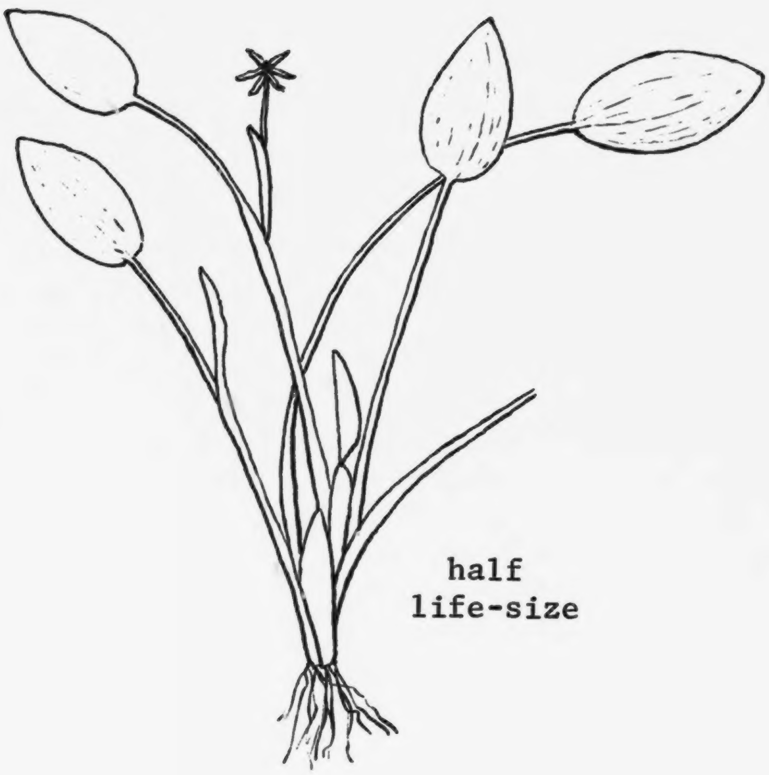
Early leaves resemble those of Broadleaf Waterplantain (page 93); but mature plants have blunt-tipped leaves and burlike balls of sharp-pointed seeds.



LONGLEAF MUDPLANTAIN,
Heteranthera limosa

Fresh water; Colorado to Minnesota, Arizona, Louisiana, and Kentucky.

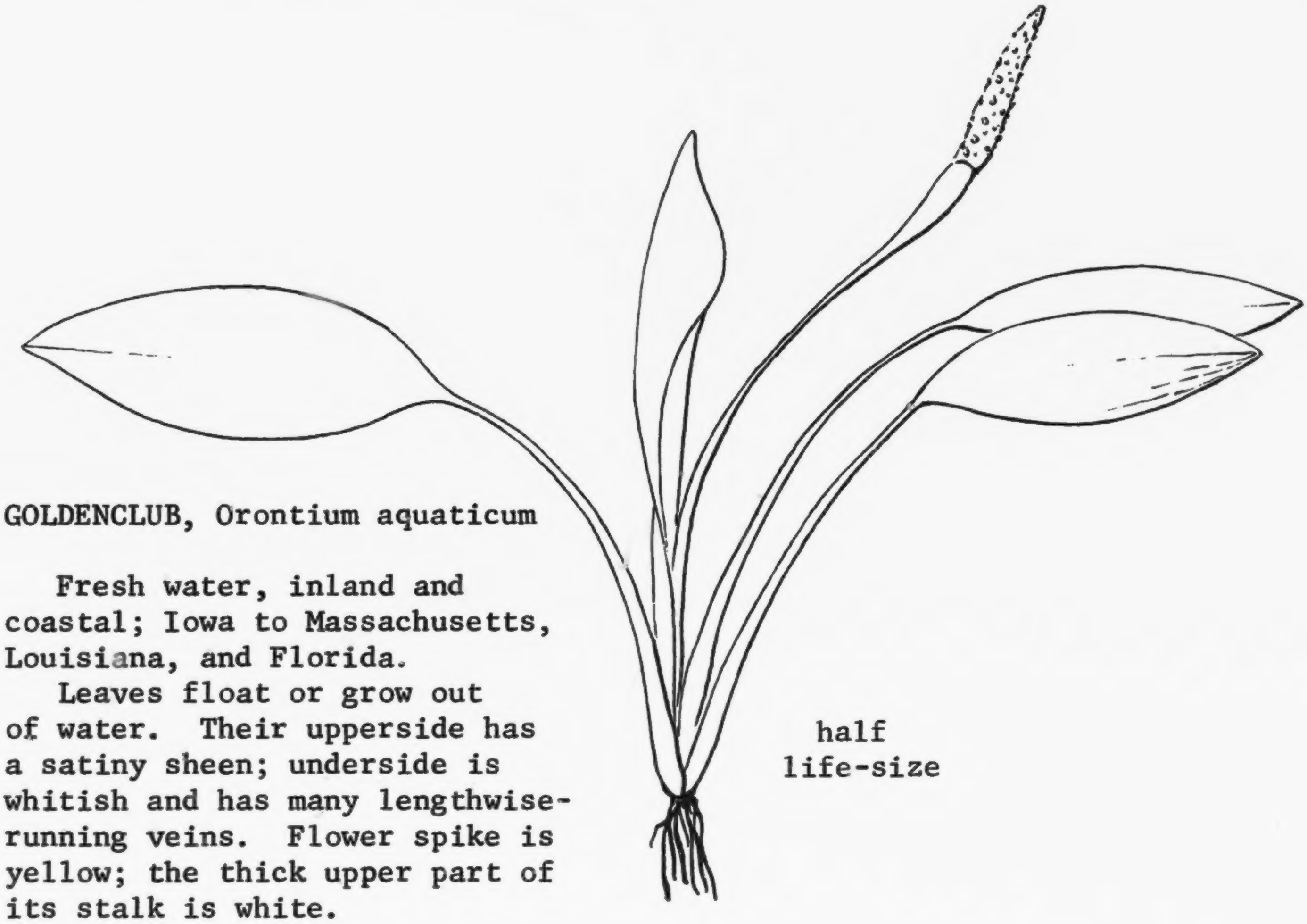
Leaves are under water, floating, or out of water. Flowers are blue or white.

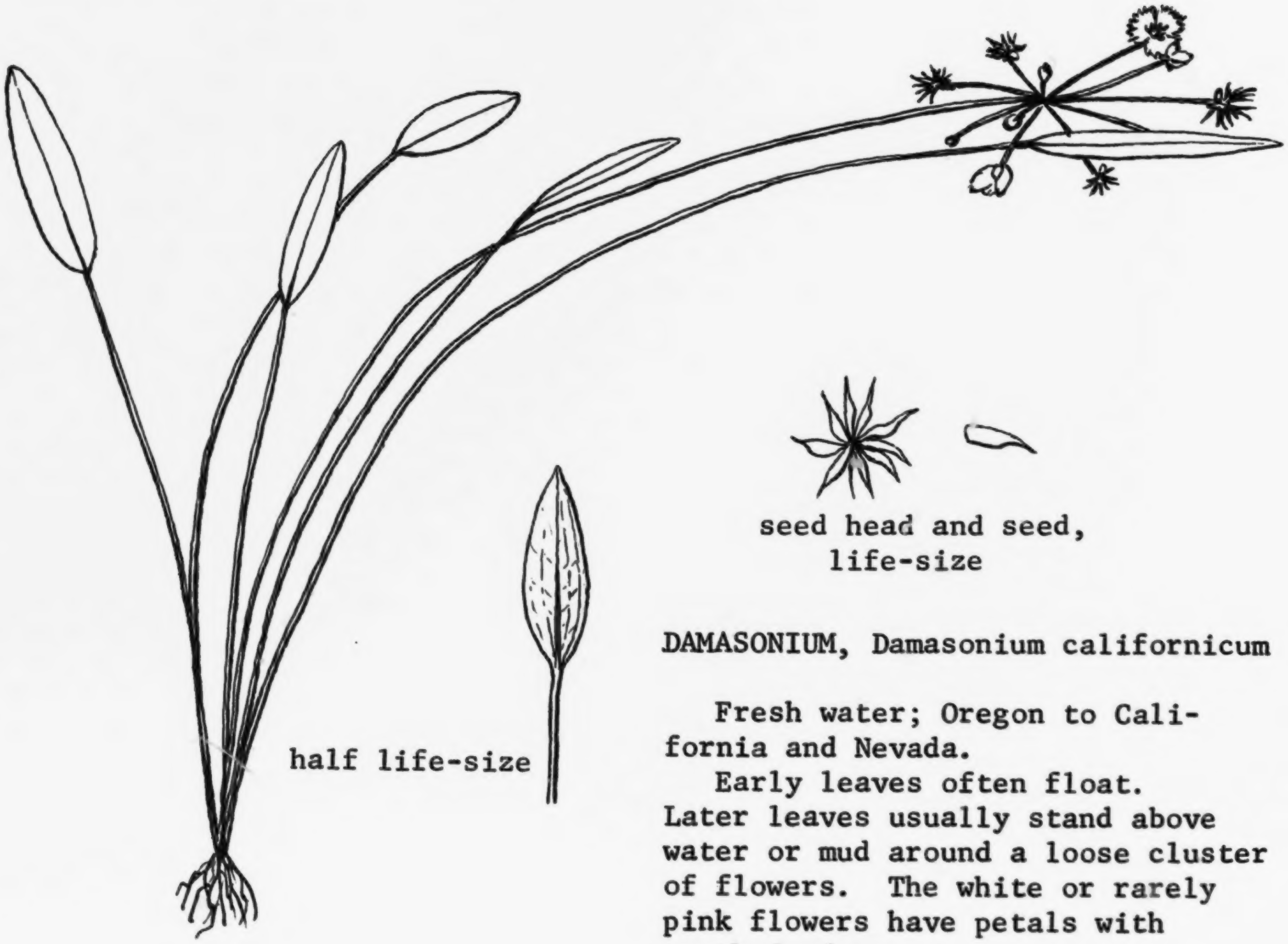

half life-size

GOLDENCLUB, Orontium aquaticum

Fresh water, inland and coastal; Iowa to Massachusetts, Louisiana, and Florida.

Leaves float or grow out of water. Their upperside has a satiny sheen; underside is whitish and has many lengthwise-running veins. Flower spike is yellow; the thick upper part of its stalk is white.


half life-size



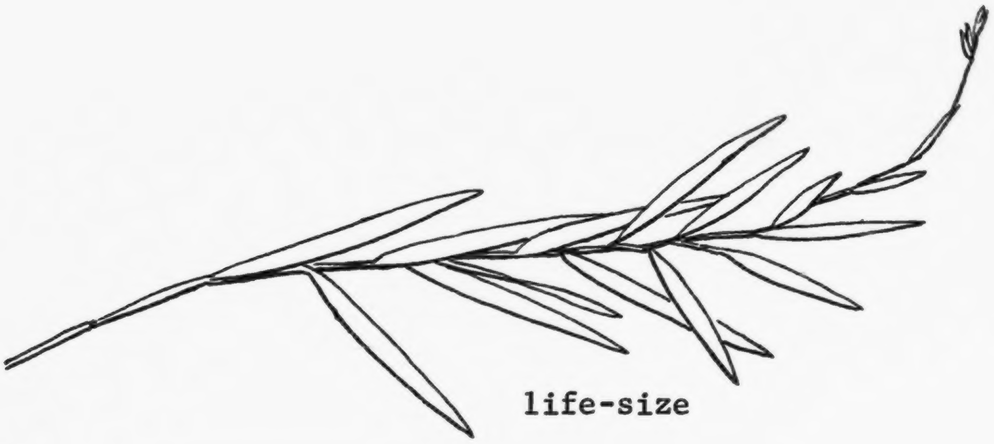
seed head and seed,
life-size

half life-size

DAMASONIUM, Damasonium californicum

Fresh water; Oregon to California and Nevada.

Early leaves often float. Later leaves usually stand above water or mud around a loose cluster of flowers. The white or rarely pink flowers have petals with toothed edges.



life-size

WATERGRASS, Hydrochloa carolinensis

Fresh water; North Carolina to Louisiana.

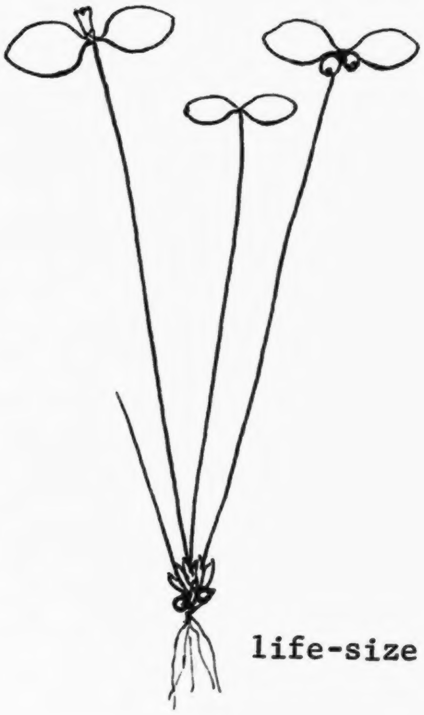
Leaves usually float in patches out from shore. Flowers are unlike those of any other plant.

Resembles a few other kinds of small-leaved grasses which are ordinarily out of water, but when temporarily flooded may be under water.

AMPHIANTHUS, Amphianthus pusillus

In depressions in granite which contain water in the spring; Alabama and Georgia.

Has a cluster of tiny leaves and flowers at the base of each plant, and a pair of larger floating leaves and a flower or two at the end of each stem.

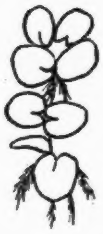


life-size

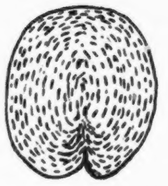
SALVINIA, Salvinia rotundifolia

A native of tropical America which has run wild in fresh water in Georgia and Florida.

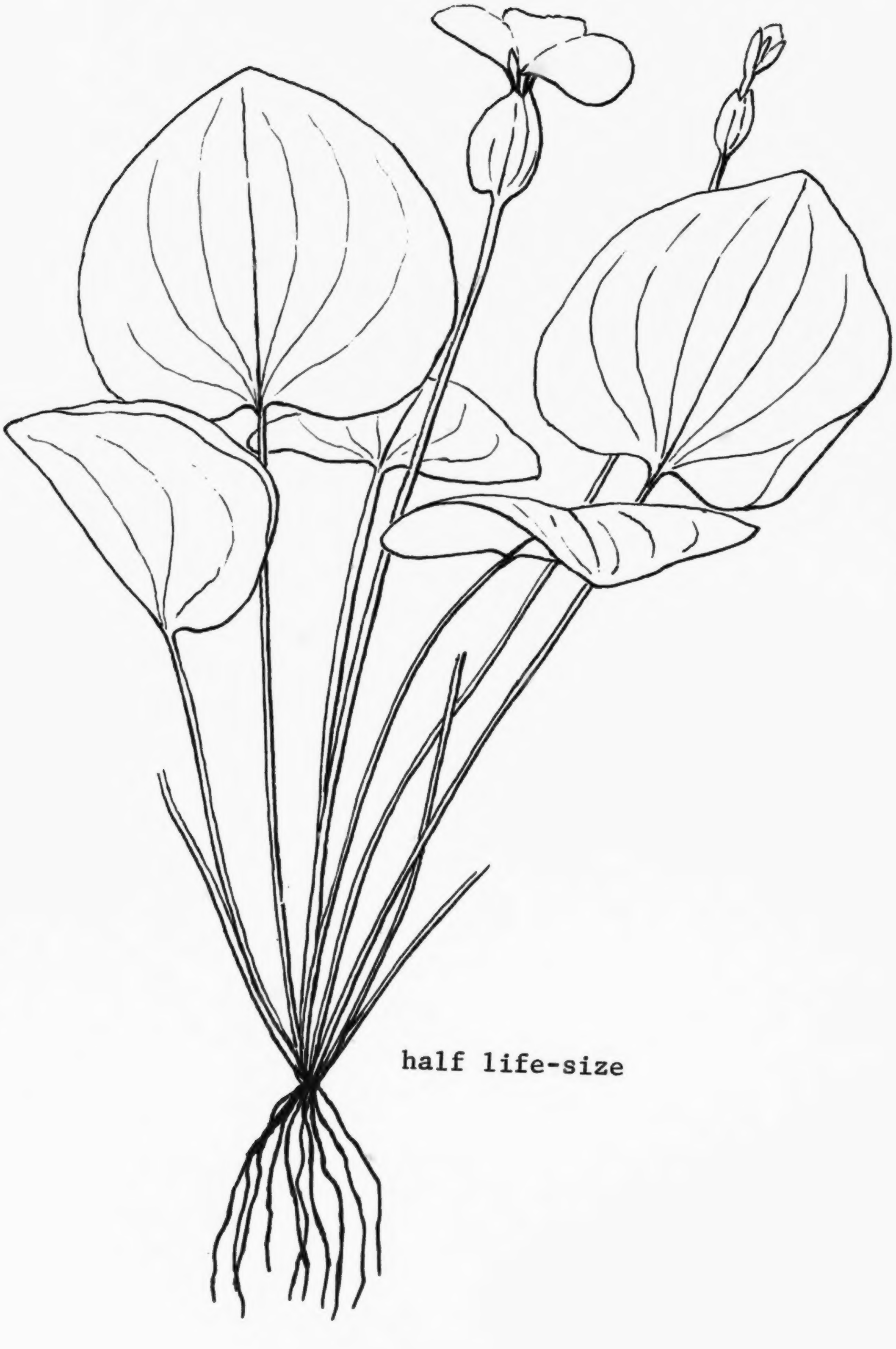
The entire plant floats, with its roots dangling in the water. Leaves are concave on the top, and have coarse hairs standing up in concentric rows.



half
life-size



two times
life-size

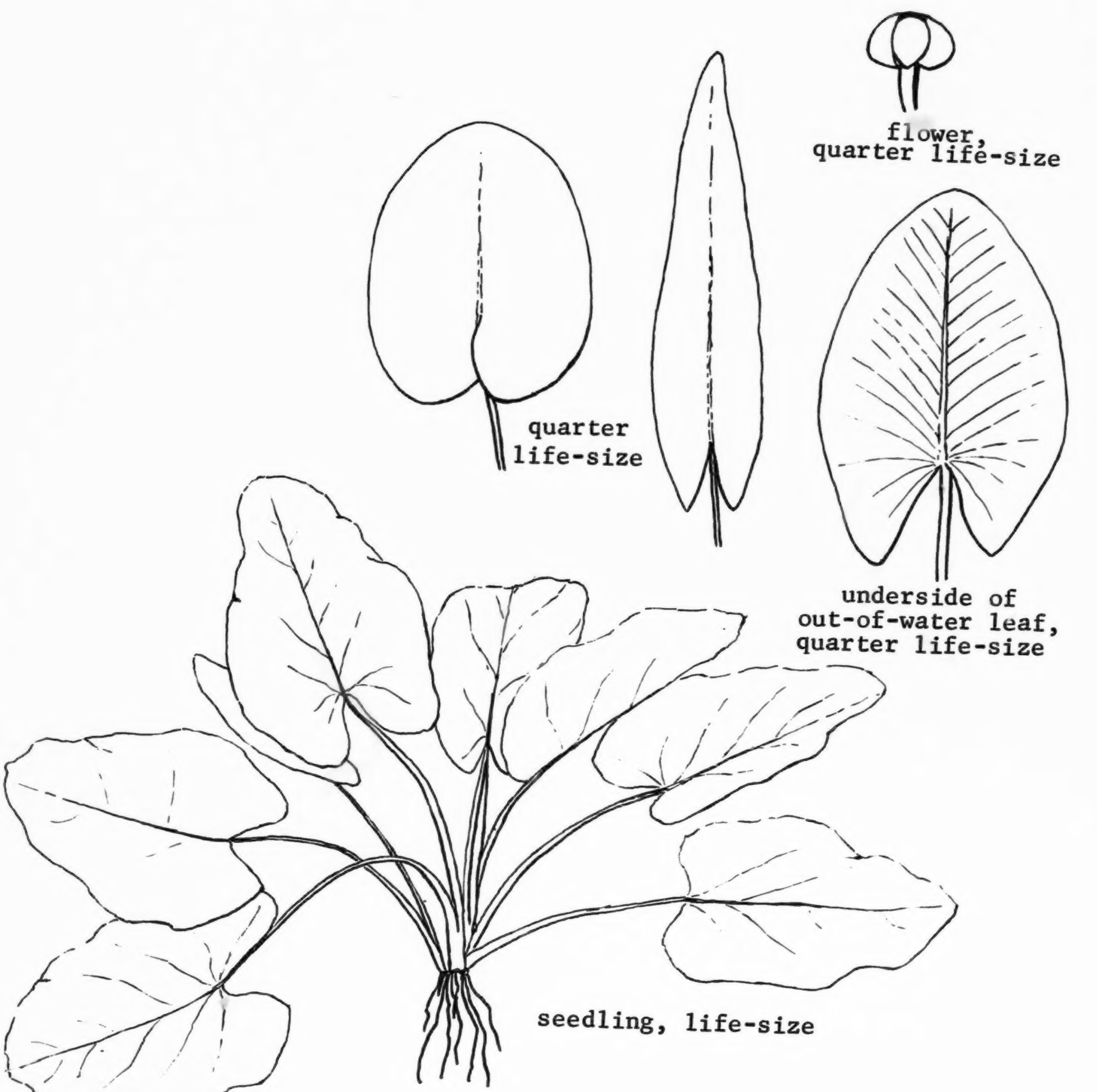


OTTELIA, Ottelia alismoides

A native of southeastern Asia and of Australia which has run wild in fresh water in southwestern Louisiana.

Leaves are under water or floating. Flowers are white or pinkish.

Group 10. PLANTS WITH LANCE-SHAPED TO ROUND FLOATING LEAVES WHICH ARE DEEPLY NOTCHED AT THE BASE; A FEW KINDS ALSO GROWING PARTLY OUT OF WATER grow in fresh inland water and in fresh to slightly brackish coastal water. The leaves of some kinds are on flexible, upright to horizontal stems; others have leaves coming up from rootstocks. Most kinds have showy flowers: white, yellow, or bluish.


flower,
quarter life-size
quarter
life-size
underside of
out-of-water leaf,
quarter life-size
seedling, life-size

SPATTERDOCK, Nuphar luteum
(all Nuphar in Fernald's and Mason's manuals; all Nymphaea in Small's manual)

Fresh water, inland and coastal; Alaska to Newfoundland, California, and Florida.

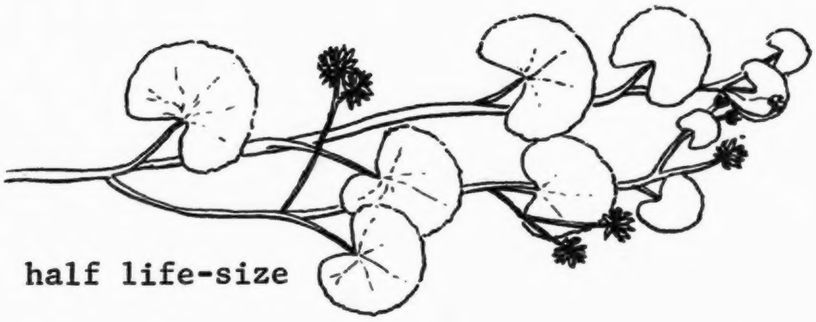
Leaves of mature plants roundish to lance-shaped, long-stalked; floating or standing above water (the latter form common along the coast from New York to Virginia). Flowers greenish outside and yellowish to reddish inside.

Leaves of seedlings flimsy and clustered under water. Seedlings resemble those of White Waterlily (page 105), with which they often grow; but Spatterdock leaves have blunter tips and a midvein with several veins on each side.

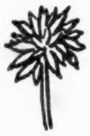
FLOATING CALTHA,
Caltha natans

Fresh water; Alaska to Northwest Territories, Alberta, and Wisconsin.

Flowers white or pinkish.



half life-size

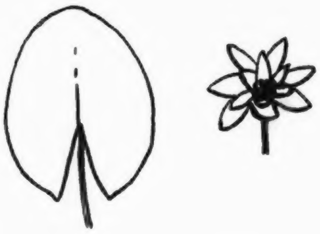


seed pods, life-size

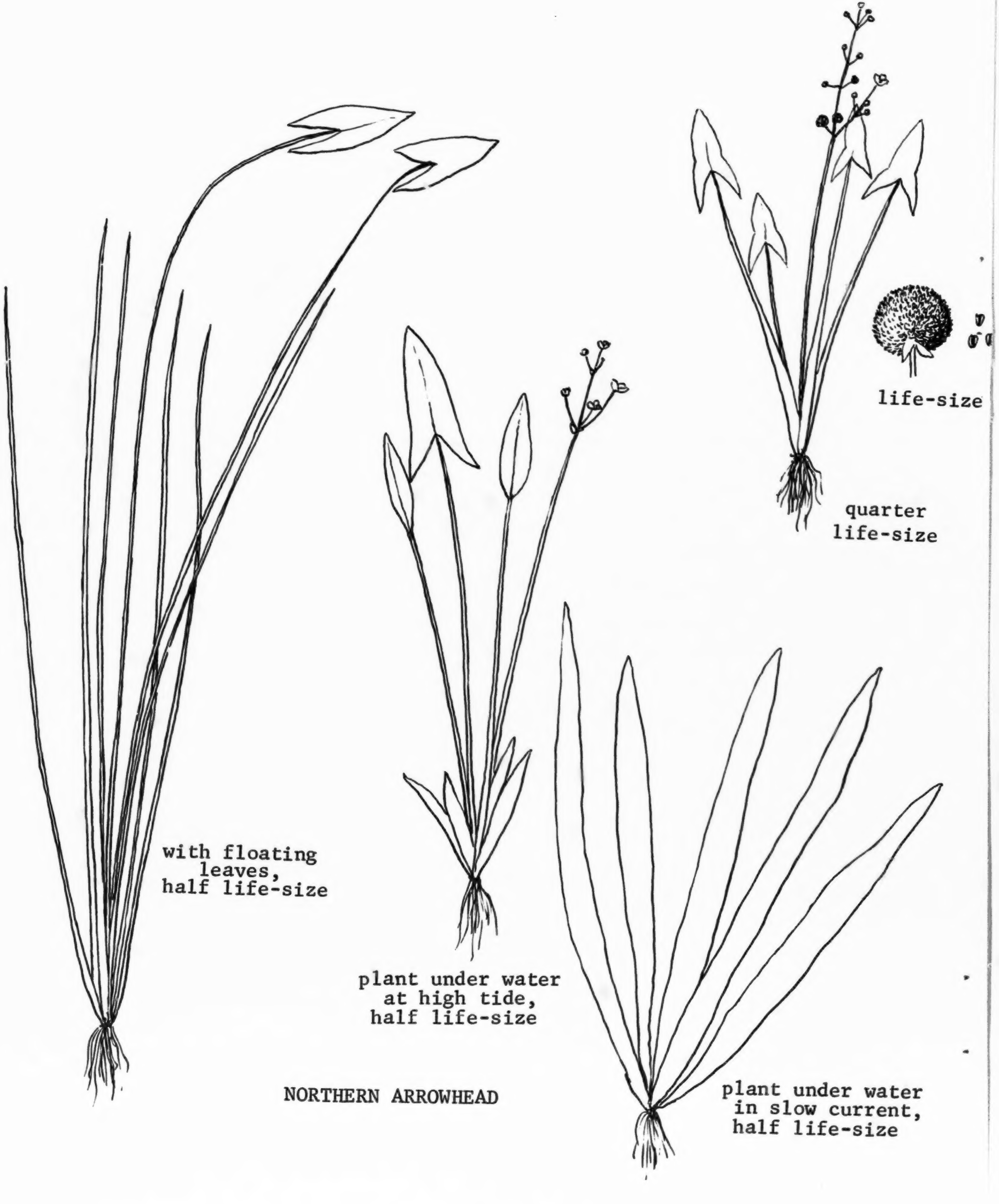
NORTHERN WATERLILY,
Nymphaea tetragona

Fresh water; Alaska to Quebec, Washington, Minnesota, and Maine.

Leaves of mature plants longer than wide. Flowers white.



quarter life-size



life-size

quarter life-size

with floating leaves, half life-size

plant under water at high tide, half life-size

plant under water in slow current, half life-size

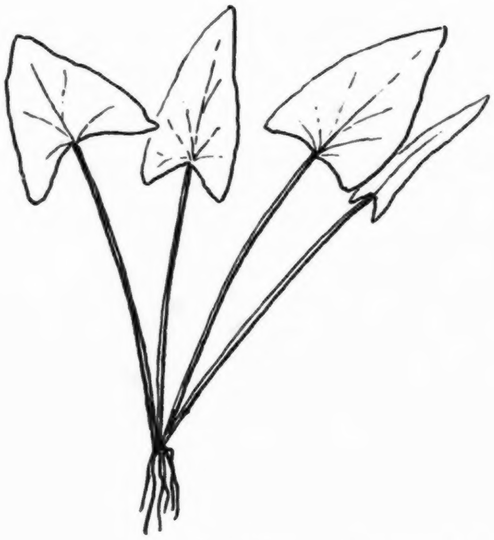
NORTHERN ARROWHEAD

NORTHERN ARROWHEAD, Sagittaria cuneata

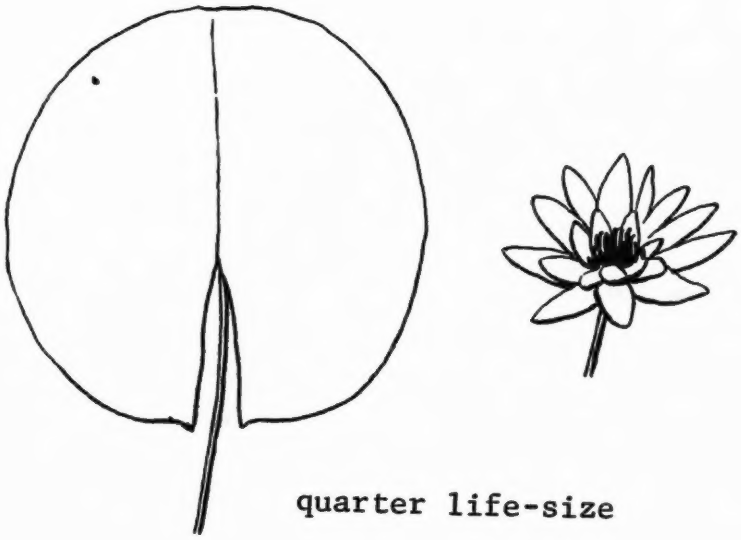
Fresh water; Alaska to Quebec, California, Texas, and Connecticut.

Sometimes has long-stalked, arrowhead-shaped floating leaves; but mature plants usually have their leaves and loose clusters of 3-petaled white flowers partly or entirely out of water. The lower flowers produce balls of tight-packed, flattish seeds.

Young plants are clumps of short and stiff to long and ribbonlike underwater leaves which cannot surely be told from some of the Arrowheads described and pictured on pages 18-20. When the leaves are ribbonlike, they can be told from the similar plants of Wildcelery, Burreeds, or Wildrice by holding a piece of leaf to the light and comparing it with the piece-of-leaf picture of Water Arrowhead on page 21 and the pictures on pages 6, 7, and 10.



seedling, life-size



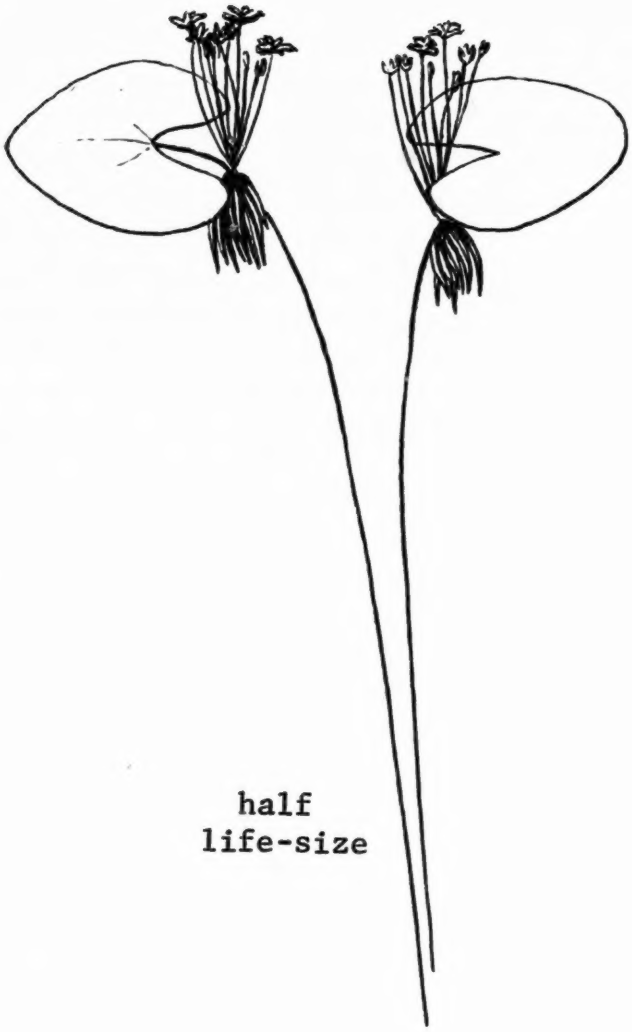
quarter life-size

WHITE WATERLILY, Nymphaea odorata
(Nymphaea tuberosa; Castalia lekophylla, minor, and odorata)

Fresh water; Manitoba to Newfoundland, Texas, and Florida.

Leaves of mature plants firm and usually floating. Leaves of seedlings flimsy and clustered under water. Flowers white or rarely pink.

Seedlings of all the Waterlilies resemble each other; but usually only one kind grows in a locality. White Waterlily seedlings resemble Spatterdock seedlings (page 102), with which they often grow; but Waterlily leaves have sharper tips, and most of the veins radiate from near the base.



LITTLE FLOATINGHEART,
Nymphoides cordatum
(Nymphoides lacunosum)

Fresh water; Ontario to Newfoundland, Louisiana, and Florida.

A cluster of white flowers reaches just out of water; and a cluster of short, thick roots dangles from the stalk just under a leaf.

Resembles Big Floatingheart (page 109); but the smaller leaves are a little longer than wide; and they are often purplish-red underneath, but not covered with close-packed dots between light-colored veins.

EUROPEAN FROGBIT, Hydrocharis morsus-ranae

Not pictured.

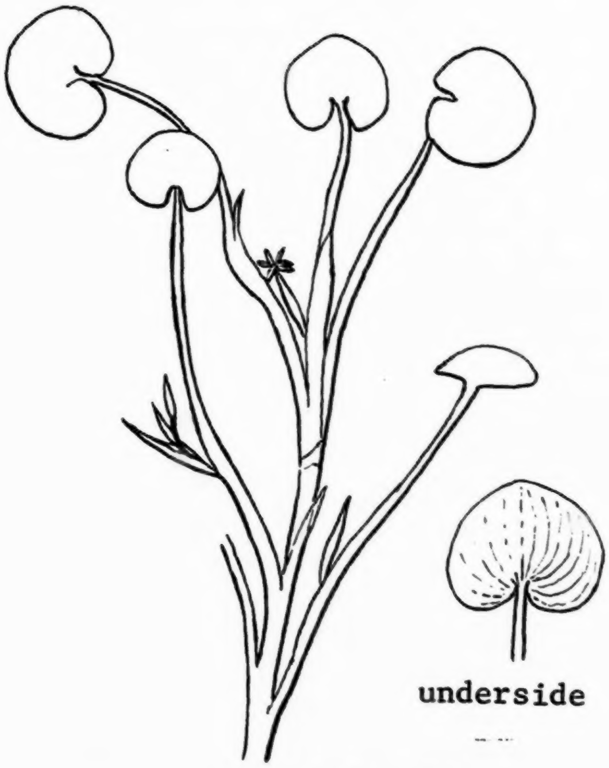
Has escaped from cultivation at Ottawa, Ontario; and since 1932 has spread several miles down the Ottawa River and been found near Montreal, Quebec.

The leaves resemble those of the floating form of American Frogbit (page 108); but they have almost no central sponginess. Three-petaled white flowers stand singly a little above the leaves. They are about 3/4 inch across and are half to two-thirds the width of a leaf.

ROUNDLEAF MUDPLANTAIN,
Heteranthera reniformis

Fresh water, inland and coastal; Kansas to Connecticut, Texas, and Florida.

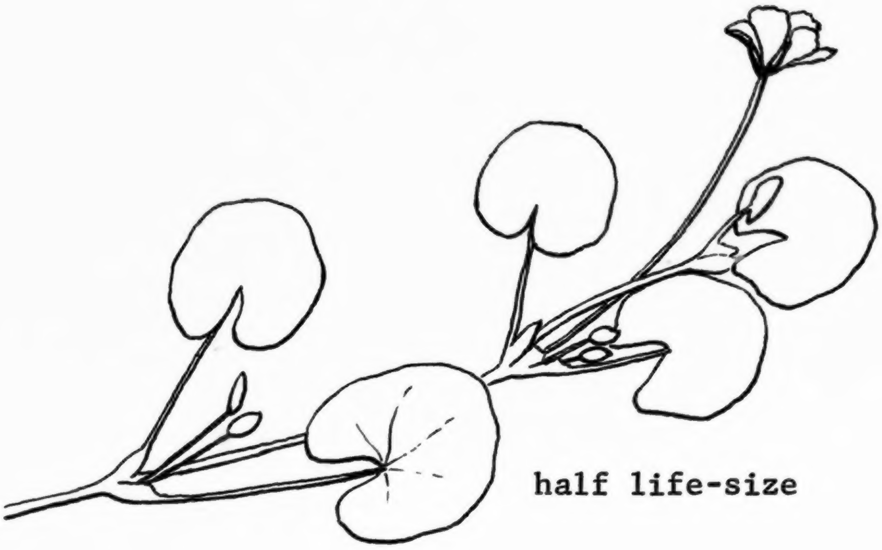
Leaves under water, floating, or out of water. Flowers white or bluish.



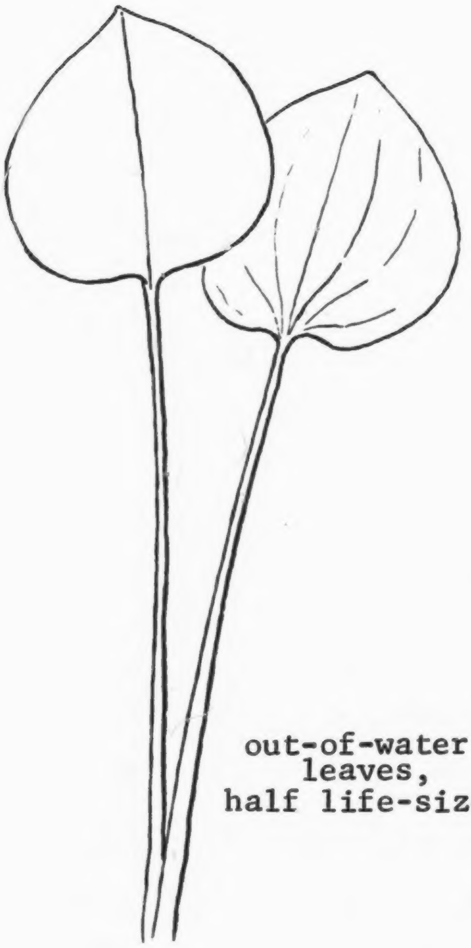
half life-size

YELLOW FLOATINGHEART,
Nymphoides peltatum

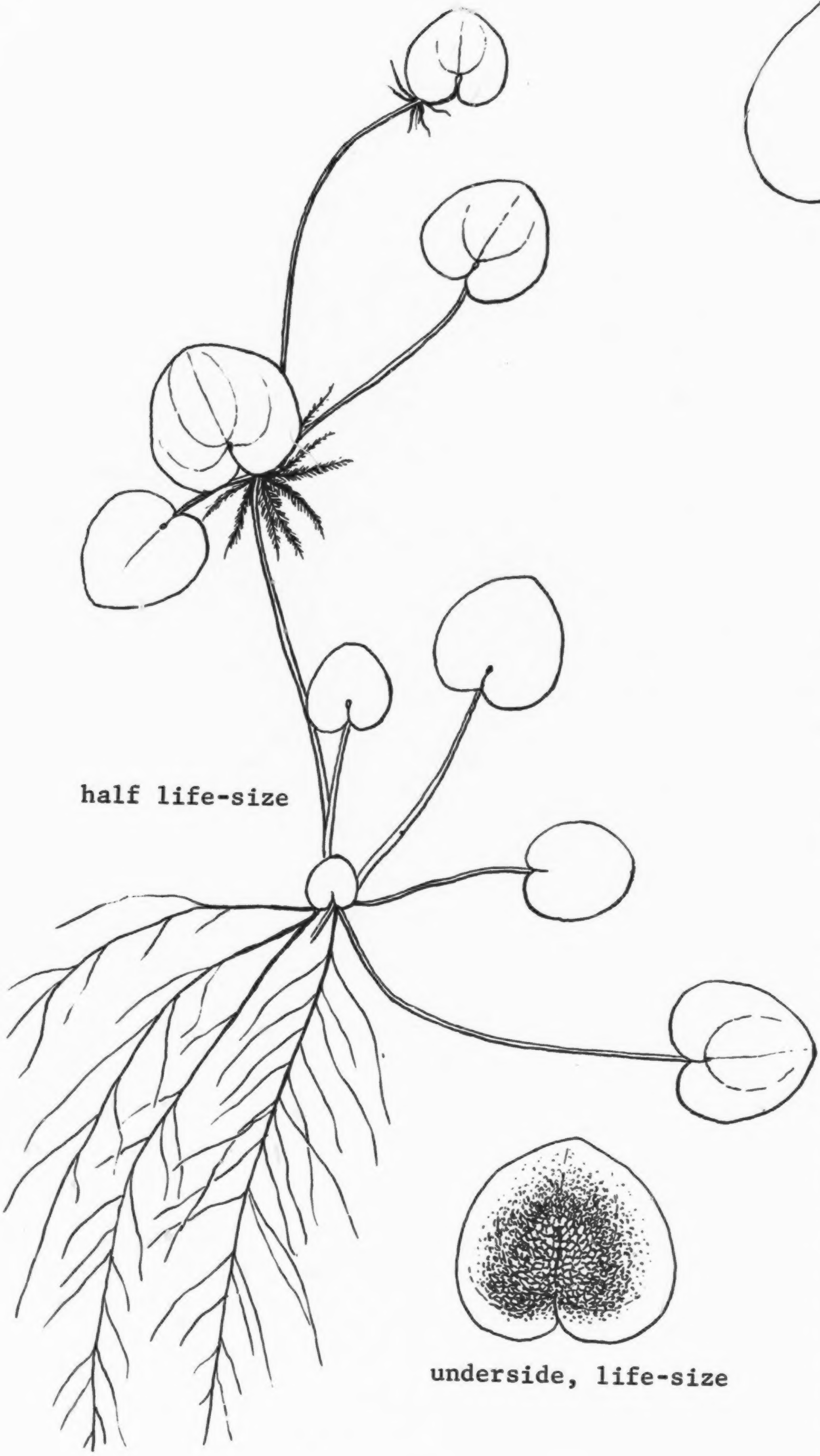
Fresh water, inland and rarely coastal; a native of Europe which has run wild in a few localities in Washington, New York, New Jersey, Missouri, Oklahoma, and Arkansas.



half life-size



out-of-water leaves, half life-size



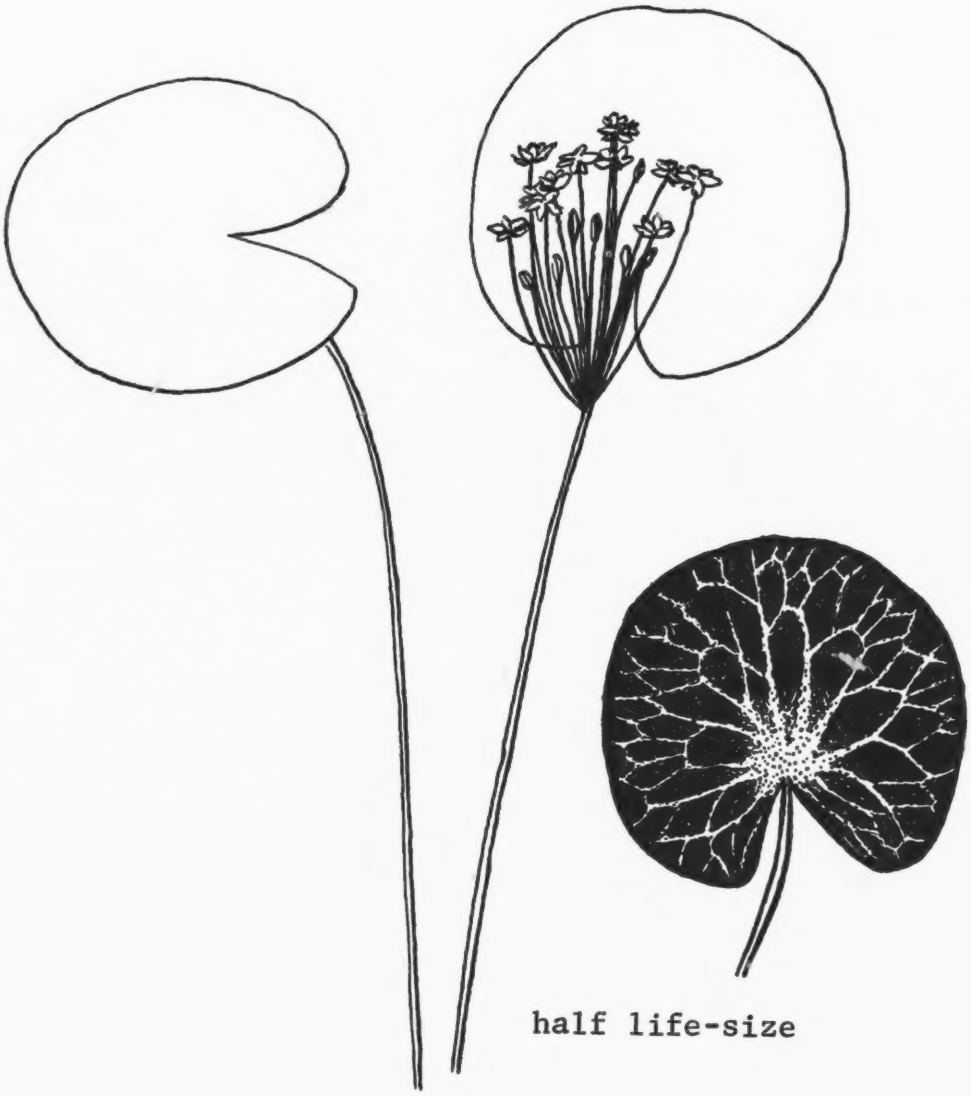
half life-size

AMERICAN FROGBIT,
Limnobium spongia

Fresh water; Missouri to Delaware, Texas, and Florida.

There are two forms. One has floating leaves which are deep-notched at the base, and are thicker in the center. The other has out-of-water leaves which are not deep-notched at the base, and are not thicker in the center.

underside, life-size



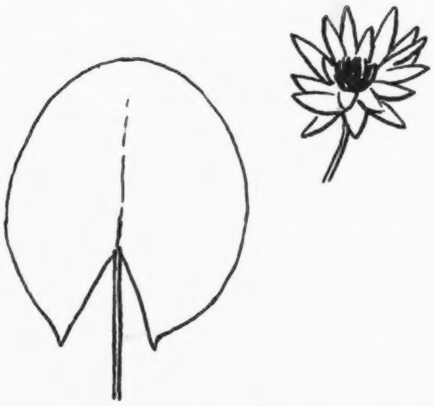
half life-size

BIG FLOATINGHEART, Nymphoides aquaticum

Fresh water; New Jersey to Texas.

A cluster of white flowers reaches just out of water; and rarely a cluster of short, thick roots dangles from the stalk just under a leaf.

Resembles Little Floatingheart (page 106); but the bigger leaves are nearly round, and they are usually purplish-red with close-packed dots underneath, except along the light-colored veins.



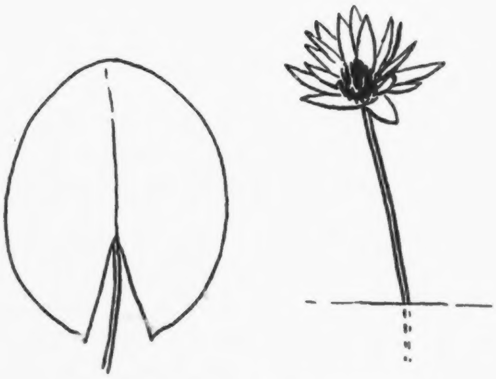
quarter life-size

BANANA WATERLILY,

Nymphaea mexicana
(Castalia flava)

Fresh inland water and fresh to slightly brackish coastal water; North Carolina to Texas.

Flowers yellow. Clusters of "bananas", an inch or two long, develop late in the year at the end of slender rootstocks.



quarter life-size

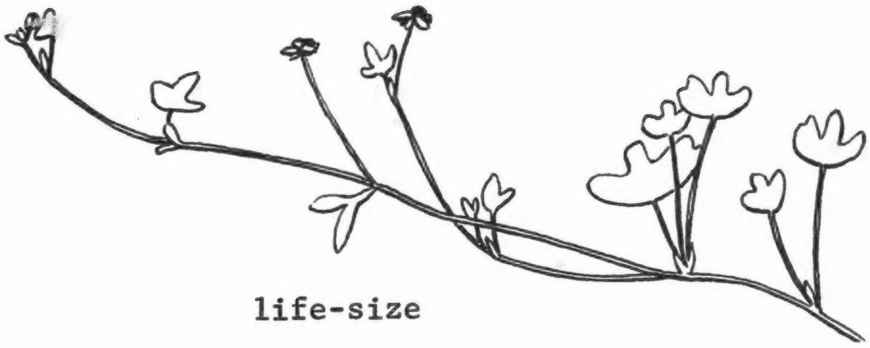
BLUE WATERLILY,

Nymphaea elegans
(Castalia elegans)

Fresh water; southern Texas (mainly), Louisiana, and Florida.

Bluish or pale-violet flowers stand several inches above the water.

Group 11. PLANTS WITH COARSE-TOOTHED, LOBED, OR DIVIDED FLOATING LEAVES; SOME KINDS ALSO GROWING PARTLY OUT OF WATER grow in fresh inland water and rarely in fresh coastal water. The leaves of Marsileas come up from rootstocks. Those of the other plants are on flexible, upright to horizontal stems.

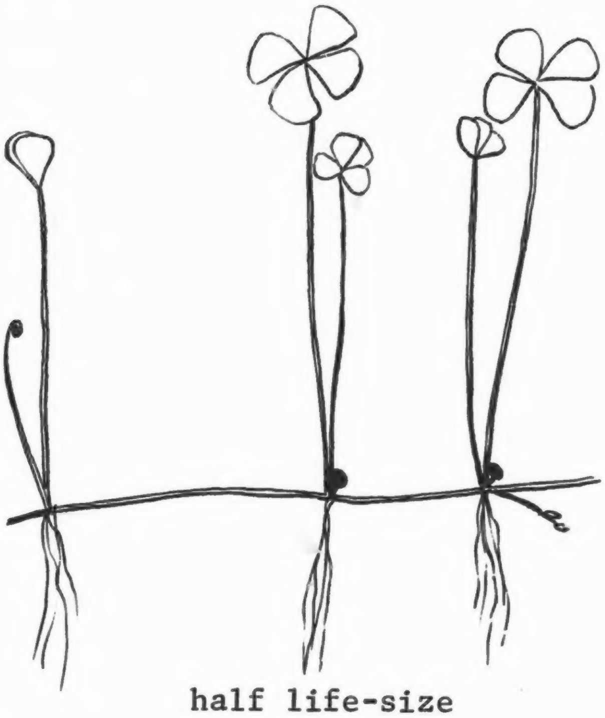


life-size

ARCTIC BUTTERCUP, Ranunculus hyperboreus

Fresh inland water and fresh to brackish coastal water; Alaska to Greenland, Montana, and Newfoundland.

Leaves floating or growing partly to entirely out of water. Flowers yellow.



half life-size

MARSILEAS, Marsilea

Fresh water; British Columbia to Massachusetts, California, and Louisiana (but commonest in the West).

Leaves are composed of four leaflets. They float, stand above water, or grow where these is no water.

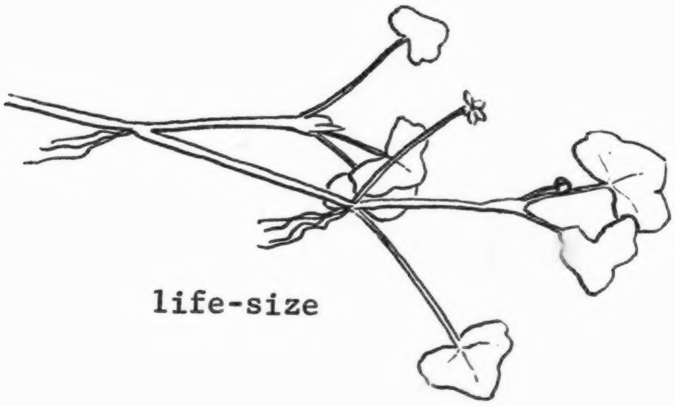
The five kinds known in Canada and the United States are described in Fernald's and Mason's manuals and in John Kunkel Small's "Flora of the Southeastern United States" (1913) as Marsilea macropoda, mucronata, quadrifolia, tenuifolia, and uncinata. Mucronata, by far the commonest, grows in southwestern Canada and the western half of the United States. Quadrifolia, a native of Europe, has run wild in a few places in the northeastern quarter of the United States. The others have been found only in Texas and neighboring states.

Tenuifolia has very narrow leaflets. The others have wide leaflets, similar to those pictured of mucronata. They can be told apart when they are bearing little bean-shaped sporocarps close to the base of leaf stalks.

IVYLEAF BUTTERCUP, Ranunculus hederaceus

This native of Europe has been found in fresh water in a few localities from Newfoundland to South Carolina.

Leaves floating or growing partly or entirely out of water. Flowers white.

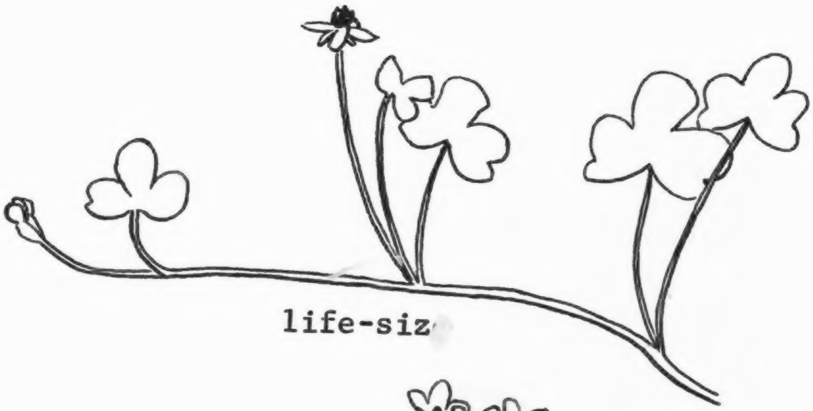


life-size

FLOATING BUTTERCUP, Ranunculus natans

Fresh water; Alberta to Colorado.

Leaves floating or growing partly or entirely out of water. Flowers yellow.



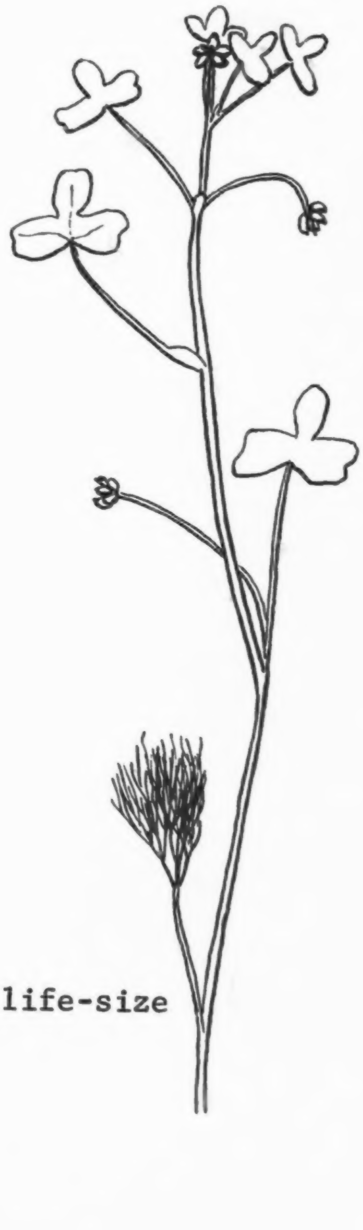
life-size

LOBB BUTTERCUP, Ranunculus lobbii

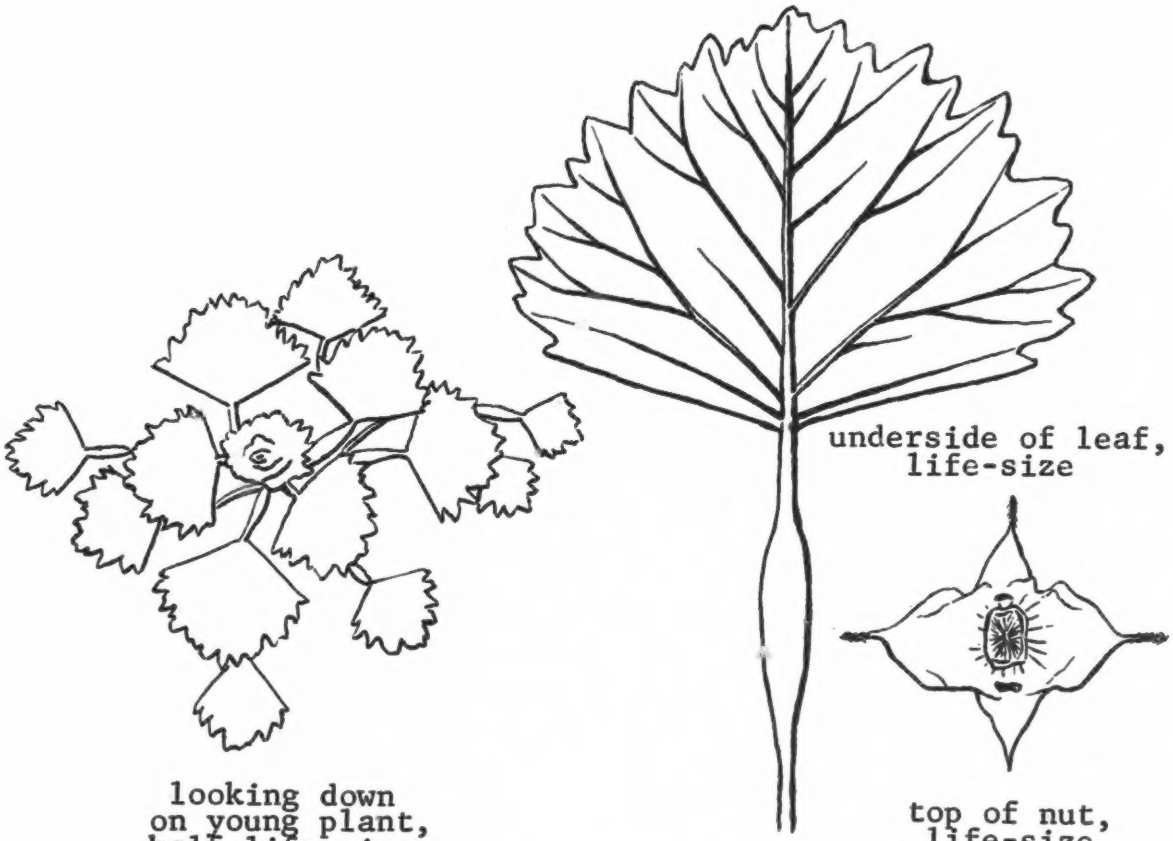
In pools which contain water in the spring; British Columbia to California.

Most of the leaves float. Sometimes there are fine-forked underwater leaves. Flowers white. Seed balls with no more than 6 seeds apiece.

Resembles White Water Buttercup (page 53); but has mainly floating leaves and fewer seeds in a ball.



life-size



looking down
on young plant,
half life-size

underside of leaf,
life-size

top of nut,
life-size

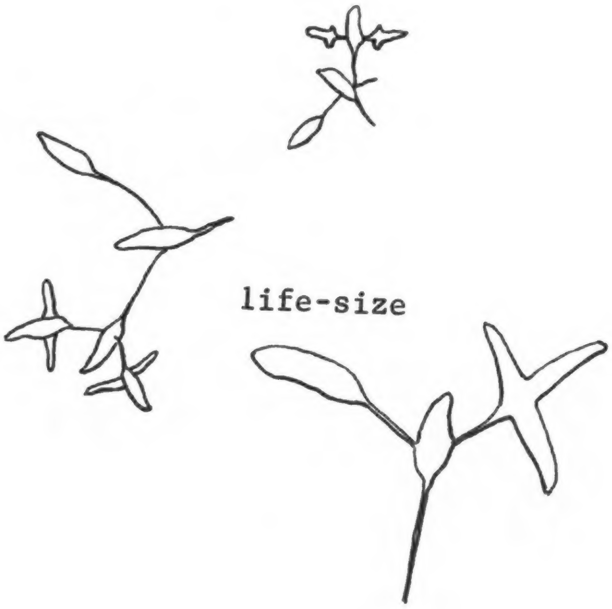
WATERCHESTNUT, Trapa natans

Beginning in the 1930's, this native of Eurasia became so abundant in fresh water in a few coastal and inland localities from New York to Massachusetts and Virginia that it spoiled boating, fishing, and swimming, and crowded out duck-food plants. In some places it has been greatly reduced by cutting and chemicals.

Rosettes of floating leaves are shiny on the upper side, dull and fine-hairy underneath. Small white flowers, on short stalks among the leaves, produce sharp-horned, inch-across nuts which, fallen to the bottom or drifted on a shore, stab bare feet.

Group 12. LITTLE, FREE-FLOATING PLANTS grow in sheltered fresh water, often in the shade of trees, shrubs, and marsh plants. Reproduction is mainly by offshoots from growing plants.

STAR DUCKWEED, Lemna trisulca



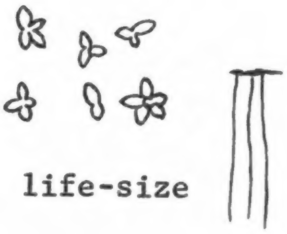
Fresh water; Alaska to Quebec, California, and Georgia (but rare in the southeastern states).

Half-floats under the surface of water which is sheltered from wind and which contains much nitrogenous matter; often under a blanket of Duckweeds and Watermeals. Dull-green. New plants grow from old ones; and several individuals are often attached to each other.

LITTLE DUCKWEEDS, Lemna
(except Lemna trisulca, above)

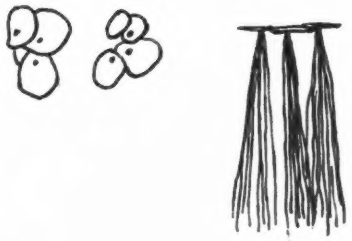
Fresh water; Alaska to Quebec, California, and Florida.

A green blanket on water which is sheltered from wind and which contains much nitrogenous matter; often mixed with Big Duckweeds and Watermeals. New plants grow from old ones; and a few individuals are often attached to each other. One root dangles in the water from each plant.



The five kinds known in Canada and the United States cannot surely be told apart without a hand lens or microscope, and then only when they have seeds. They are Lemna gibba, minima, minor, perpusilla (trinervis), and valdiviana (cyclostasa).

BIG DUCKWEEDS, Spirodela

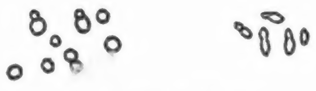

Spirodela polyrhiza, life-size

Fresh water; British Columbia to Nova Scotia, California, and Florida.

A green blanket on water which is sheltered from wind and which contains much nitrogenous matter; often mixed with Little Duckweeds and Watermeals. Green above, often reddish underneath. New plants grow from old ones; and a few individuals are often attached to each other. A cluster of roots dangles in the water from each plant.

Two kinds are known in Canada and the United States. Spirodela polyrhiza has the range given above, and is the commonest. Each plant usually has 6 or more roots. Spirodela oligorhiza (not pictured) is a native of southeastern Asia and Australia which, since the 1930's, has been found wild in California; and from Missouri to Maryland, Louisiana, and Florida. It is about the same size and shape as the Little Duckweeds (page 115), and each plant usually has only 2 or 3 roots.

WATERMEALS, Wolffia


two times life-size

Fresh water; Oregon, California, and Utah; and Nebraska to Quebec, Texas, and Florida.

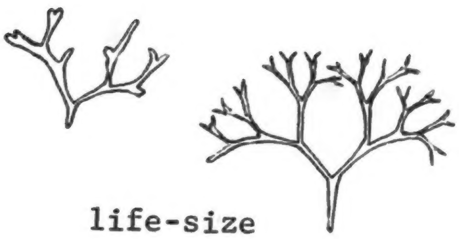
A green blanket on water which is sheltered from wind and which contains much nitrogenous matter; often mixed with Duckweeds. Individual plants are the size of a small pinhead. New plants grow from old ones; and two individuals are often attached to each other.

The five kinds known in Canada and the United States cannot surely be told apart without a hand lens or microscope. They are Wolffia arrhiza, columbiana (Bruneria columbiana), cylindracea, papulifera, and punctata (Bruneria punctata). The pictures show differences which can sometimes be seen with the naked eye: the round type is light-green all over; the oval type floats on the water like a boat, and is darker green on the top than it is underneath.

RICCIA, Riccia fluitans

Fresh water, British Columbia to Maine, California, and Florida.

Half-floats under the surface of water which is sheltered from wind and which contains much nitrogenous matter; often under a blanket of Duckweeds.

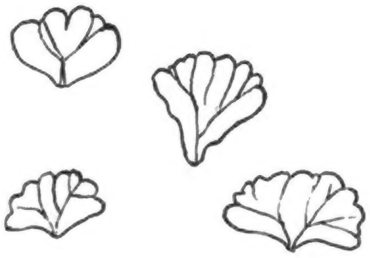


life-size

RICCIOCARPUS, Ricciocarpus natans

Fresh water, British Columbia to Maine, California, and Florida.

On water which is sheltered from wind and which contains much nitrogenous matter; often mixed with Duckweeds. Underside covered with dark-reddish, dangling, rootlike scales.



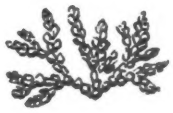
life-size

WATER-VELVETS, Azolla

Fresh water; British Columbia to Idaho, California, and New Mexico; and Minnesota to New Hampshire, Texas, and Florida.

A dull-green to reddish blanket on water which is sheltered from wind and which contains much nitrogenous matter.

The three kinds known in Canada and the United States cannot surely be told apart without a hand lens or microscope. They are Azolla caroliniana, filiculoides, and mexicana.

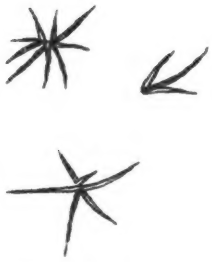


two times life-size

EASTERN WOLFFIELLA,
Wolffiella floridana

Fresh water; Illinois to Massachusetts, Texas, and Florida (but commonest in the southeastern states).

Half-floats under the surface of water which is sheltered from wind and which contains much nitrogenous matter; often under a blanket of Duckweeds and Watermeals. Looks like fine-slivered pieces of grass.

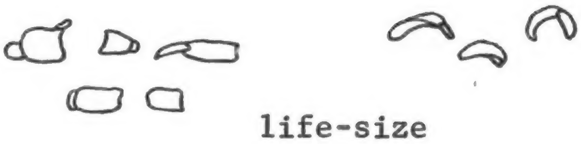


life-size

TONGUE WOLFFIELLA,
Wolffiella lingulata

Fresh water; California and Louisiana.

Half-floats under the surface of the water.



life-size

INDEX

Alisma geyeri, 9
    gramineum, 9
    plantago-aquatica, 93
    subcordatum, 93
    triviale, 93
AMPHIANTHUS, 99
Amphianthus pusillus, 99
Armoracia aquatica, 57
ARROWHEAD, BUR, 18
    HOODED, 18, 19
    NORTHERN, 104, 105
    SLENDER, 18, 19
    WATER, 18, 20, 21
Azolla caroliniana, 117
    filiculoides, 117
    mexicana, 117

BACOPA, ROUNDLEAF, 94
Bacopa eisenii, 94
    nobsiana, 94
    rotundifolia, 94
Batrachium trichophyllum, 53
    flaccidum, 53
Bidens beckii, 56
Biovularia olivacea, 50
BLADDERWORT, BIG FLOATING, 49
    COMMON, 45
    DWARF, 50
    EASTERN, 47
    FLATLEAF, 44
    GIANT, 50
    HIDDEN-FLOWER, 46
    HORNED, 26
    LAVENDER, 27
    LITTLE FLOATING, 48
    NORTHERN, 43
    PURPLE, 46
    ZIGZAG, 27
Brasenia schreberi, 91
Bruneria columbiana, 116
    punctata, 116
BULRUSH, ALGA, 59
    WATER, 8
BURHEAD, UPRIGHT, 96
BURREEDS, 6, 7
Butomus umbellatus, 11
BUTTERCUP, ARCTIC, 111
    CREEPING, 16
    FLOATING, 113
    IVYLEAF, 113
    LOBB, 113
    WHITE WATER, 53
    YELLOW WATER, 54

Cabomba caroliniana, 58
Callitriche anceps, 62
    autumnalis, 62
    hermaphroditica, 61, 62
    heterophylla, 62
    longipedunculata, 62
    palustris, 62
    stagnalis, 62
    verna, 61, 62
CALTHA, FLOATING, 103
Caltha natans, 103
Castalia elegans, 110
    flava, 110
    lekophylla, 105
    minor, 105
    odorata, 105
Ceratophyllum demersum, 55
    echinatum, 55
    submersum, 55
Chara, 52
COONTAIL, 55
CRESS, LAKE, 57
Cymodocea manatorum, 13

DAMASONIUM, 98
Damasonium californicum, 98
Didiplis diandra, 68
DUCKWEED, STAR, 115
DUCKWEEDS, BIG, 116
    LITTLE, 115

- Echinodorus berteroi, 96
  - cordifolius, 96
  - rostratus, 96
- EELGRASS, 11
- Elatine ambigua, 63
  - americana, 63
  - brachysperma, 63
  - californica, 63
  - chilensis, 63
  - gracilis, 63
  - heterandra, 63
  - minima, 63
  - obovata, 63
  - rubella, 63
  - triandra, 63
- Eleocharis acicularis, 14
  - coloradoensis, 23
  - parvula, 23
- ELODEA, COMMON, 66
  - SOUTH AMERICAN, 68
- Elodea canadensis, 66
  - densa, 68
  - nuttallii, 66
- Eriocaulon compressum, 25
  - lineare, 25
  - parkeri, 25
  - septangulare, 25

- FANWORT, 58
- FEATHERFOIL, 41
- FLOATINGHEART, BIG, 109
  - LITTLE , 106
  - YELLOW, 107
- FLOWERING-QUILLWORT, 28
- FLOWERING-RUSH, 11
- FROGBIT, AMERICAN, 108
  - EUROPEAN, 106

- Glyceria borealis, 7
- GOLDENCLUB, 97
- GOLDENPERT, 66
- Gratiola aurea, 66

- Halodule wrightii, 12
- HALOPHILA, CARIBBEAN, 30
  - GULF, 30
- Halophila baillonis, 30
  - engelmanni, 30
- Hemianthus glomeratus, 70
- Heteranthera dubia, 79
  - limosa, 97
  - reniformis, 107
- Hippuris tetraphylla, 60
  - vulgaris, 60
- HORNED-PONDWEED, 63
- Hottonia inflata, 41
- Hydrocharis morsus-ranae, 106
- Hydrochloa carolinensis, 98

- Isnardia intermedia, 67
  - palustris, 67
  - repens, 67
- Isoetes bolanderi, 17
  - braunii, 17
  - butleri, 17
  - eatoni, 17
  - engelmanni, 17
  - flaccida, 17
  - foveolata, 17
  - howellii, 17
  - macrospora, 17
  - melanopoda, 17
  - melanospora, 17
  - muricata, 17
  - nuttallii, 17
  - occidentalis, 17
  - orcuttii, 17
  - riparia, 17
  - saccharata, 17
  - tuckermani, 17
  - virginica, 17

- Juncus pelocarpus, 26
  - repens, 69

- Lecticula resupinata, 27
- Lemna cyclostasa, 115
  - gibba, 115
  - minima, 115
  - minor, 115
  - perpusilla, 115
  - trinervis, 115
  - trisulca, 115
  - valdiviana, 115
- Lilaea scilloides, 28

LILAEOPSIS, EASTERN, 29
  WESTERN, 29
Lilaeopsis chinensis, 29
  lineata, 29
  occidentalis, 29
Limnobium spongia, 108
LIMNOPHILAS, 59
Limnophila indica, 59
  sessiliflora, 59
LIMOSELLA, 22
Limosella acaulis, 22
  aquatica, 22
  subulata, 22
LITTORELLA, 23
Littorella americana, 23
  uniflora, 23
LOBELIA, WATER, 22
Lobelia dortmanna, 22
Lophotocarpus calycinus, 18
  spongiosus, 18
LOTUS, AMERICAN, 95
Ludwigia natans, 67
  palustris, 67

Macuillamia rotundifolia, 94
MANATEEGRASS, 13
MANNAGRASS, NORTHERN, 7
MARESTAIL, 60
MARSH-PURSLANE, 67
MARSILEAS, 112
Marsilea macropoda, 112
  mucronata, 112
  quadrifolia, 112
  tenuifolia, 112
  uncinata, 112
MAYACA, 70
Mayaca aubletii, 70
  fluviatilis, 70
Megalodonta beckii, 56
MERMAIDWEED, MARSH, 36
MICRANTHEMUM, 70
Micranthemum micranthemoides, 70
MUDPLANTAIN, LONGLEAF, 97
  ROUNDLEAF, 107
MUSKGRASSES, 52
Myriophyllum alterniflorum, 33
  brasiliense, 39
  elatinoides, 42
  exalbescens, 32
  farwellii, 36
  heterophyllum, 35
  hippuroides, 35
  humile, 37
  laxum, 42
  magdalenense, 32
  pinnatum, 40
  proserpinacoides, 39
  spicatum, 38
  tenellum, 24
  verticillatum, 34

NAIAD, SPINY, 67
NAIADS, 64, 65
Najas conferta, 64
  flexilis, 64
  gracilis, 67
  gracillima, 64
  graminea, 65
  guadalupensis, 65
  marina, 67
  minor, 65
  muenscheri, 65
  olivacea, 65
Nelumbo lutea, 95
Neobeckia aquatica, 57
Nitella, 52
NITELLAS, 52
Nuphar luteum, 102
Nymphaea, 102
Nymphaea elegans, 110
  mexicana, 110
  odorata, 105
  tetragona, 103
  tuberosa, 105
Nymphoides aquaticum, 109
  cordatum, 106
  lacunosum, 106
  peltatum, 107

Orontium aquaticum, 97
OTTELIA, 100
Ottelia alismoides, 100

PARROTFEATHER, 39
Peplis diandra, 68
Persicaria muhlenbergii, 90
Philotria canadensis, 66
    densa, 68
    linearis, 66
Phyllospadix scouleri, 12
    torreyi, 12
PILLWORT, 28
Pilularia americana, 28
PIPEWORT, EARLY, 25
    NORTHERN, 25
Podostemon abrotanoides, 57
    ceratophyllum, 57
Podostemum ceratophyllum, 57
Polygonum amphibium, 89
    coccineum, 90
    natans, 89
PONDWEED, ALGA, 78
    BIGLEAF, 85
    BIGSHEATH, 74
    BLUNTLEAF, 77
    BOG, 91
    CURLY, 86
    FERN, 79
    FLATSTEM, 76
    FLOATING, 88
    FRIES, 75
    HEARTLEAF, 94
    LEAFY, 77
    LONGLEAF, 92
    OAKES, 88
    RED, 81
    RIBBONLEAF, 76
    SAGO, 72
    SLENDER, 75
    SNAILSEED, 78
    THREADLEAF, 71
    VARIABLE, 82
    VASEY, 80
    WESTERN, 80
    WHITESTEM, 83
Potamogeton alpinus, 81
    amplifolius, 85
    angustifolius, 82
    berchtoldi, 75
    bicupulatus, 78
    capillaceus, 78
    confervoides, 78
    crispus, 86
    curtissii, 77
    diversifolius, 78
    epihydrus, 76
    fibrillosus, 77
    filiformis, 71
    fluitans, 92
    foliosus, 77
    friesii, 75
    gemmiparus, 75
    gramineus, 82
    heterophyllus, 82
    hillii, 77
    illinoensis, 82
    lateralis, 75
    latifolius, 80
    longiligulatus, 75
    lucens, 82
    natans, 88
    nodosus, 92
    oakesianus, 88
    oblongus, 91
    obtusifolius, 77
    pectinatus, 72
    perfoliatus, 84
    porteri, 77
    praelongus, 83
    pulcher, 94
    pusillus, 75
    richardsonii, 84
    robbinsii, 79
    spirillus, 78
    strictifolius, 75
    vaginatus, 74
    vaseyi, 80
    zosteriformis, 76
Proserpinaca amblyogona, 36
    palustris, 36
    platycarpa, 36

QUILLWORTS, 16, 17

Ranunculus aquatilis, 53
    delphinifolius, 54
    flabellaris, 54
    flammula, 16
    gmelini, 54
    hederaceus, 113
    hyperboreus, 111
    lobbii, 113
    longirostris, 53
    natans, 113
    reptans, 16
    subrigidus, 53
    trichophyllus, 53
REDHEAD-GRASS, 84
RICCIA, 117
Riccia fluitans, 117
RICCIOCARPUS, 117
Ricciocarpus natans, 117
RIVERWEED, 57
Ruppia maritima, 73
    occidentalis, 73
RUSH, BOG, 26
    CREEPING, 69

Sagittaria calycina, 18
    chapmanii, 18
    cristata, 18
    cuneata, 105
    cycloptera, 18
    eatoni, 18
    filiformis, 18
    graminea, 18
    isoetiformis, 18
    lorata, 18
    macrocarpa, 18
    rigida, 18
    stagnorum, 18
    subulata, 18
    teres, 18
    weatherbiana, 18
SALVINIA, 99
Salvinia rotundifolia, 99
Scirpus confervoides, 59
    nanus, 23
    subterminalis, 8
Setiscapella cleistogama, 27
    subulata, 27
SHOALGRASS, 12
SMARTWEED, MARSH, 90
    WATER, 89
Sparganium americanum, 7
    androcladum, 7
    angustifolium, 7
    chlorocarpum, 7
    eurycarpum, 7
    fluctuans, 7
    glomeratum, 7
    hyperboreum, 7
    minimum, 7
    multipedunculatum, 7
    simplex, 7
SPATTERDOCK, 102
SPIKERUSH, DWARF, 23
    SLENDER, 14, 15
Spirodela oligorrhiza, 116
    polyrhiza, 116
Stomoisia cornuta, 26
    juncea, 26
    virgatula, 26
SUBULARIA, 18
Subularia aquatica, 18
SURFGRASS, 12

Thalassia testudinum, 13
TILLAEA, 62
Tillaea aquatica, 62
Tillaeastrum aquaticum, 62
Tolypella, 52
TOLYPELLAS, 52
Trapa natans, 114
TURTLEGRASS, 13

Utricularia biflora, 47
    cornuta, 26
    fibrosa, 47
    floridana, 50
    foliosa, 50
    geminiscapa, 46
    gibba, 47
    inflata, 49
    inflata var. minor, 48
    intermedia, 44
    juncea, 26
    macrorhiza, 45
    minor, 43
    ochroleuca, 44
    olivacea, 50
    pumila, 47
    purpurea, 46
    radiata, 48

Utricularia, continued
    resupinata, 27
    subulata, 27
    vulgaris, 45

Vallisneria americana, 10
    spiralis, 10
Vesiculina purpurea, 46

WATERCHESTNUT, 114
WATERGRASS, 98
WATERLILY, BANANA, 110
    BLUE, 110
    NORTHERN, 103
    WHITE, 105
WATER-MARIGOLD, 56
WATERMEALS, 116
WATERMILFOIL, ANDEAN, 42
    EASTERN, 40
    EURASIAN, 38
    FARWELL, 36
    LEAFLESS, 24
    LITTLE, 33
    LOW, 37
    NORTHERN, 32
    SOUTHERN, 42
    VARIABLE, 35
    WHORLED, 34
WATERPLANTAIN, BROADLEAF, 93
    NARROWLEAF, 9
WATER-PURSLANE, 68
WATERSHIELD, 91
WATER-STARGRASS, 79
WATER-STARWORTS, 61, 62
WATER-VELVETS, 117
WATERWORTS, 63
Websteria submersa, 59
WIDGEONGRASS, 73
WILDCELERY, 10
WILDRICE, 7
Wolffia arrhiza, 116
    columbiana, 116
    cylindracea, 116
    papulifera, 116
    punctata, 116
WOLFFIELLA, EASTERN, 118
    TONGUE, 118
Wolffiella floridana, 118
    lingulata, 118

Zannichellia palustris, 63
Zizania aquatica, 7
Zostera marina, 11
Zosterella dubia, 79

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The Department of the Interior, created in 1849, is our Nation's Department of Natural Resources, concerned with management, conservation, and development of water, wildlife, fish, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

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